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TRANSACTIONS OF THE OHIO STATE MEDICAL SOCIETY 1861.

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TRANSACTIONS

OF THE

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SIXTEENTH ANNUAL MEETING

OF THE

OHIO STATE MEDICAL SOCIETY,

HELD AT

OHIO WHITE SULPHUR SPRINGS,

June 25th and 26th, 1861.

COLUMBUS:
FOLLETT, FOSTER AND COMPANY.
1861.

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TRANSACTIONS

OF THE

OHIO STATE MEDICAL SOCIETY,

HELD AT

OHIO WHITE SULPHUR SPRINGS, JUNE 25, 26, 1861.

OHIO WHITE SULPHUR SPRINGS,
June 25th, 1861—10 o'clock A. M.

The Ohio State Medical Society met in the Hall prepared for that purpose by the proprietor, Andrew Wilson, jun., Esq., in the Grove of the Ohio White Sulphur Springs, and was called to order by the President of the Society, Dr. Conklin.

Dr. Kincaid, from the Executive Committee, made the following report, which, on motion, was adopted:

The Executive Committee of the Ohio State Medical Society beg leave to report, that they have procured of Mr. Wilson this large, commodious and well-fitted Hall for the deliberations of the Society at its present session, and would recommend the adoption of the following order of business:

The hours of meeting shall be at 9 o'clock A. M., and 2 P. M.

1st. Reading of the minutes.

2d. Report of the Committee on Admissions.

3d. Annual election of officers.

4th. Valedictory of the retiring President, unless otherwise directed by the Society.
5th. Reports of Standing Committees.
6th. Reports of Special Committees.
7th. Miscellaneous business.
8th. Volunteer Reports.

W. P. KINCAID, } *Ex. Com.*
G. E. C. WEBER, }

The President nominated Drs. Brown, Woodward, and Gaston to fill vacancies in the Committee on Admissions.

A letter from Dr. W. M. Awl was read resigning his membership in this Society; which resignation was, on motion, accepted.

On motion of Dr. Boerstler, Dr. W. M. Awl was made an honorary member.

Dr. Pomerene, from the Committee on Admissions, reported in favor of the application of Dr. P. Beeman of Sydney, O., who was duly elected to membership.

On motion of Dr. Weber, the President appointed a committee to nominate officers for the ensuing year, consisting of Drs. G. E. C. Weber, I. S. Dodge, G. C. Blackman, W. W. Bridge, and B. S. Brown.

The committee thus appointed made the following nomination of officers, all of which were duly elected by ballot:

President—[illegible]B. WRIGHT, M.D., of Cincinnati.

Vice-Presidents—J. PLYMPTON, M.D., of Madison; J. HARMAN, M.D., of Warren; N. DALTON, M.D., of Logan; R. GUNDRY, M.D., of Dayton.

Secretaries—W. W. DAWSON, M.D., of Cincinnati; T. B. WILLIAMS, M.D., of Delaware.

Treasurer—J. B. THOMPSON, M.D., of Columbus.

Librarian—ROBT. THOMPSON, M.D., of Columbus.

Committee on Admissions—Drs. LANDON, POMERENE, REAMY, GORDON, and SWENEY.

On motion, the Society took a recess until 2 o'clock P. M.

TWO O'CLOCK P. M.

The Society resumed its session.

Dr. Conklin appointed Drs. Weber and Gordon to conduct the President elect to the chair.

Dr. Wright, on taking the chair, in a few appropriate remarks, acknowledged the honor conferred upon him by the Society.

The President called the Standing Committees.

Dr. Gundry, Chairman of the Committee on Publication, made a verbal report as to the publishing of the Transactions of the last year; which was accepted.

There being no reports from the Special Committees, on motion, they were all continued.

Dr. C. P. Landon, from Committee on Admissions, reported in favor of the application of Dr. A. J. Longfellow, of Quincy, Logan County, O., who was duly elected to membership.

Dr. D. S. Gans presented a certificate, as delegate, from the Academy of Medicine, of Cincinnati. That society not being an auxiliary society, he could not be admitted; but Dr. Gans was, on motion of Dr. Weber, invited to take a seat during the present meeting.

Dr. R. Wallace, of Lewisburg, and Dr. Jno. P. Haggett, of Eaton, presented certificates, as delegates, from the Eaton (Preble Co.) Medical Society; and, on motion, they were invited to take seats during the present session.

The President appointed the following gentlemen the Finance Committee: Drs. W. P. Kincaid, J. Pomerene, G. W. Boerstler, C. P. Landon, and J. C. Reeve.

Dr. J. B. Thompson, Treasurer, made his annual report; which, on motion, was referred to the Committee on Finance.

Dr. Sinnet moved that Dr. G. W. Boerstler be requested to read a paper in his possession, on "Eruptive Disease of April, May and June, 1860."

After the reading, Dr. A. H. Baker moved that the paper be referred to the Committee on Publication.

The Valedictory Address of the retiring President, Dr. H. S. Conklin, was made the order of the day for to-morrow, at 9 o'clock A. M.

On motion of Dr. Kincaid, Dr. Pomerene was requested to read a paper which he had prepared on Diptheria.

The paper being read, Dr. Kincaid moved that it be referred to the Committee on Publication.* Remarks upon it were made by Drs. Kincaid, Reeves, Harman, Boestler, Reamy, Culbertson, Bly, Gordon, and Landon.

Dr. Weber stated that Dr. Bly, the inventor of *artificial limbs*, was present, and he moved that he be invited to take a seat in the Society, and also to exhibit his invention.

The Committee on Admissions reported in favor of the applications of the following gentlemen, who were thereupon elected members, viz.:

Dr. A. V. Patterson, ...	Galion.
" R. Wallace, ...	Eaton.
" J. C. Reeve, ...	Dayton.
" Daniel S. Gans, . . .	Cincinnati.

On motion, Society adjourned.

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* MS. not received by Committee on Publication.

SECOND DAY.

WEDNESDAY, June 26th, 1861.

Society met. President in the chair.

Minutes read and approved.

The President announced the following gentlemen as the Committee on Ethics: Drs. I. S. Dodge, P. Beeman, H. Culbertson, B. S. Brown, T. W. Gordon.

The Valedictory of the ex-President, being the order of the day, was called. After the reading, on motion of Dr. Kincaid, the address was referred to the Publication Committee. Remarks upon the address were made by Drs. Baker and Kincaid.

Dr. H. Culbertson announced that he would read a paper on "Experiments on Inferior Animals to determine in what manner Chloroform produces death."

Dr. Dalton gave notice that he would read a paper on "The Analogy of Masmatic and Electric changes in the production of disease."

The Committee on Admissions reported in favor of the application of Dr. John Pearl Haggett, of Eaton, O., who thereupon was duly elected a member.

Dr. Kincaid offered the following resolution:

Resolved, That when this Society adjourns, it do so *to meet at this place on the 3d Tuesday of June,* 1862.

Dr. Reamy offered the following resolution:

Resolved, That a committee of three be appointed by this Society to nemorialize the General Assembly of the State of Ohio, at their next ession, asking the enactment of a law regulating the fees of medical experts, so that they may be commensurate with the services rendered.

The resolution being read, remarks were made by Drs.

Reamy, Reeve, Gundry, Weber, Blackman, Dawson, Baker, and Kincaid. The President appointed Drs. Reamy, Thompson, and Kincaid as such committee.

Dr. Wallace offered the following resolutions:

Resolved, That it is the duty of each member of the "Ohio State Medical Society" to use all his influence among his professional brethren, in the county in which he lives, to induce them to organize and sustain a "County Medical Society."

Resolved, That it is degrading to the medical profession and dishonorable to the Faculty and Trustees of a Medical College, to confer honorary degrees on men who are so ignorant of literature and medical science, that they can not become members of the medical society of the county in which they live.

Resolved, That when the Faculty of a Medical College ascertain that, by being deceived, they have conferred an honorary degree on an illiterate individual, who is daily guilty of *gross unprofessional conduct, it is the duty of the Faculty to revoke it.*

The above resolutions were, on motion, adopted.

Dr. Kincaid, Chairman of the Finance Committee, offered the following report, which, on motion, was adopted:

To the Ohio State Medical Society:

The Committee on Finance, to whom was referred the report of Dr. J. B. Thompson (Treasurer), beg leave to make the following report:

Your Committee have examined the accounts and vouchers of the Treasurer, in detail, and find them to be correct, as read by him before the Society.

We would recommend that the Treasurer be permitted to credit two dollars ($2 00) on the account of Dr. D. S. Lyman, in consideration of his having sent the same to the Treasurers of 1856 and 1857, and not received credit therefor.

And, that whereas, many persons formerly members of this Society have, by removing from the State, and by other acts of their own, forfeited all claims to membership of this Society; and, whereas, many members have deceased, and others been expelled, therefore your committee would recommend that the Treasurer be instructed to publish a corrected list of the *bona fide* members only, for future reference of the Society.

And, in consideration of the want of funds in the hands of the Treasurer, and of the surplus number of the Transactions yearly left on hand, we would further recommend that there be only 250 copies of the Transactions published this year.

We also recommend that there be an assessment of one dollar upon each member, to defray the current expenses of the present year.

All of which is respectfully submitted,

W. P. KINCAID,
E. SINNET,
W. P. LANDON,
G. W. BOERSTLER,
WM. H. REEVES.

Dr. Kincaid offered the following resolution:

Resolved, That a committee of five be appointed by this Society, by request of the Faculty, whose duty it shall be to meet with the Faculty of the Medical College of Ohio, at their next regular examination of students for the degree of M.D., and participate in said examination.

Before the question was taken, Dr. Kincaid remarked that the President last year appointed a similar committee, of which he was one. The examinations at the College were in writing before the committee. The students who were examined for degrees acquitted themselves in the most highly creditable manner—reflecting honor upon the Institution. He most heartily approbated such a system—it will be not only protective to the profession, but act as a stimulant to the graduation of those, and those only, of high attainments. He hoped the resolution would pass.

Further remarks were made by Drs. Weber, Conklin, Harman, Baker, and Gans, when the resolution was adopted.

Dr. D. S. Lyman presented his resignation, which being received, on motion, was accepted.

The Society took a recess until 2 P. M.

TWO O'CLOCK, P. M.

The Society resumed its session.

Dr. H. Culbertson, by request, read the paper of which

he gave notice this morning, viz.: "Experiments upon inferior animals to determine in what manner chloroform produces death."

Dr. J. C. Reeve, after some remarks highly complimentary, moved that the paper be referred to the committee on Publication.

Dr. Dalton was called on to read the paper which he announced this morning, viz.: "The analogy of Miasmatic and Electric changes in the production of disease."

Whereupon, on motion of Dr. Gordon, the paper was referred to the committee on Publication.

The Committee on Admissions reported in favor of the applications of the following gentlemen, who were thereupon elected members, viz.:

Dr. A. E. Wigton, ...	Delaware.
" E. D. Bowers, ...	Columbus.
" M. L. Books, ...	Cleveland.

Dr. Sinnet was requested to read the history of a case of *Dry Gangrene*, which was, on motion, referred to the Committee on Publication.

Dr. Landon offered the following resolution, which, on motion, was adopted:

Resolved, That the Committee on Finance shall superintend the monetary affairs of the Society, inspect and audit all bills and accounts of the Treasury, and make such an assessment by a *pro-rata* tax upon the resident members, as may be necessary for incidental expenses; which, however, shall be subject to the approval of the Society.

The Committee on Prize Essays, Dr. M. B. Wright, Chairman, reported that no papers had been presented to the committee. The committee was, on motion, continued for the present year. (See page 14.)

The following resolution being presented, on motion, was adopted:

Resolved, That this Society repudiate the doctrine that its members are never to testify on the side of the prosecution in cases of malpractice.

On motion of Dr. Landon, it was

Resolved, That the Secretaries be requested to report the proceedings of the Society to papers for publication.

The following resolution, presented by Dr. Gundry, was adopted:

Resolved, That the thanks of the Society be, and they are hereby tendered to Mr. Wilson, the proprietor of the Ohio White Sulphur Springs, for the use of his fine, airy, and well-arranged hall, during the deliberations of the Society, and for the courtesy and kindness received from him and from all connected with the Springs, by each individual member present.

The President announced the following gentlemen as the committee to meet with the Faculty of the Medical College of Ohio, under the resolution presented by Dr. Kincaid:

Dr. G. W. Boerstler, ...	Lancaster.
" R. Hills, ...	Columbus.
" L. Firestone, ...	Wooster.
" W. P. Kincaid, ...	Neville.
" S. P. Hunt, ...	Morrow.

The following resolution was presented by Dr. Sinnet, and, on motion, adopted:

Resolved, That we have witnessed the exhibition of Dr. Douglas Bly's "*Ball and Socket Jointed Artificial Leg*" with extreme delight, and are free to express that its motions and mechanism surpass any thing of the kind that we have ever before become acquainted with.

Dr. Gundry presented the resolution following, which, on motion, was adopted:

Resolved, That the President appoint a special committee of five, to

report to the next annual meeting of this Society, upon the legal duties and privileges of medical witnesses in Ohio.

The Chair appointed Drs. R. Gundry, J. J. Quinn, W. P. Kincaid, Robert Thompson and M. Effinger.

The President announced the following committees for the ensuing year:

STANDING COMMITTEES.

Executive—H. S. Conklin, W. W. Bridge, S. P. Hunt, L. W. Moe, A. J. Longfellow.

Finance—W. P. Kincaid, G. W. Boerstler, C. P. Landon, W. H. Reeves, E. Sinnet.

Publication—W. W. Dawson, T. B. Williams, Chas. Woodward, A. V. Patterson, R. L. Sweney.

Medical Ethics—I. S. Dodge, P. Beeman, H. Culbertson, B. S. Brown, T. W. Gordon.

Medical Societies—R. Wallace, J. M. Snodgrass, T. A. Reamy, E. Gaston, M. Dawson.

SPECIAL COMMITTEES.

Surgery—G. C. Blackman, W. L. McMillen, C. McDermott.

Medical Literature—J. C. Reeve, T. G. Armour, D. S. Gans.

Obstetrics—J. D. Cotton, G. W. Boerstler, A. E. Wigton.

Microscope—G. C. E. Weber.

Uterine Diseases—G. W. Boerstler, W. H. Reeves.

Practice—John A. Murphy, C. P. Landon, J. P. Haggett.

Obstetrical Surgery—M. B. Wright, A. Wilson.

Obituaries—H. Culbertson, Chas. Woodward, A. F. Matson.

Diptheria—W. W. Dawson, D. Noble, S. Hart, M. L. Brooks, E. D. Bowers.

Insanity—R. Gundry.

DELEGATES TO AMERICAN MEDICAL ASSOCIATION.

DELEGATES.	ALTERNATES.
W. P. Kincaid, Neville.	E. C. Sharp, Jr., Williamsburg.
G. C. E. Weber, Cleveland.	P. Thayer, Cleveland.

DELEGATES.	ALTERNATES.
J. Delamater, Cleveland.	H. K. Cushing, Cleveland.
R. R. McMeens, Sandusky.	H. H. Dunahoo, Sandusky.
D. Tilden, do	A. H. Agard, do
W. Morehead, Zanesville.	C. C. Hildreth, Zanesville.
F. T. Hurxthal, Massillon.	L. Slusser, Canal Fulton.
John H. Rodgers, Springfield.	R. Rodgers, Springfield.
Adam Musgrove, Urbana.	I. N. Beach, West Jefferson.
A. Wilson, Sidney.	C. G. Eaton, Clyde.
L. Firestone, Wooster.	A. C. Miller, Orville.
A. H. Baker, Cincinnati.	C. S. Muscroft, Cincinnati.
G. C. Blackman, do	G. Mendenhall, do
E. B. Stephens, do	J. H. Tate, do
M. B. Wright, do	B. F. Richardson, do
J. P. Judkins, do	C. G. Comegys, do
J. A. Murphy, do	E. Williams, do
W. W. Dawson, do	W. H. Mussey, do
S. Bonner, do	J. Dodge, do
H. G. Carey, Dayton.	J. Clements, Dayton.
J. Davis, do	J. Taylor, Carrollton.
C. McDermott, do	W. H. Lamme, Centreville.
A. McLaughlin, Fremont.	W. H. Reeves, Springfield.
J. Pomerene, Mt. Hope.	S. Glass, Haysville.
J. G. Rodgers, New Richmond.	T. J. Mullen, New Richmond.
A. Metz, Massillon.	H. A. McAbee, Canton.
John B. Thompson, Columbus.	P. Goble, Worthington.
J. W. Hamilton, do	R. N. Barr, Columbus.
S. M. Smith, do	A. Sabine, do
W. L. McMillen, do	S. Loving, do
C. W. W. Mahlman, do	W. H. Drury, do
W. C. Daniels, Toledo.	C. H. Swain, Toledo.
W. W. Jones, do	S. P. Forbes, do
C. P. Landon, Westerville.	E. Sinnet, Granville.
G. V. Dorsey, Piqua.	B. Neff, Piqua.
T. L. Wright, Bellefontaine.	B. S. Brown, Bellefontaine.
E. P. Fyffe, Urbana.	J. M. Southard, Marysville.
T. B. Johnson, Xenia.	Wm. Bell, Xenia.
D. Noble, Sugar-tree Ridge.	A. Robb, Dodsonville.
J. N Gard, Greenville.	H. W. Darwin, Gettysburg.
P. Allen, Kinsman.	D. B. Woods, Warren.
G. W. Boerstler, Lancaster.	M. Effinger, Lancaster.
G. E. Eels, Lithopolis.	N. Dalton, Logan.
G. F. Mitchell, Mansfield.	N. Baker, Lucas.
S. Hart, Marietta.	J. D. Cotton, Marietta.
J. P. Cowan, Ashland.	J. Brownson, Newton Falls.
E. L. Hill, Oxford.	L. Rigdon, Hamilton.
T. B. Williams, Delaware.	J. A. Carothers, Kilbourne.

DELEGATES.	ALTERNATES.
E. Gaston, Morristown.	M. M. Jenkins, Bellair.
J. C. Thompson, South Bloomfield.	W. J. Scott, Shadeville.
L. J. Abbott, Sidney.	W. H. Harper, Lima.
J. F. McFarland, Tiffin.	W. H. Park, Tiffin.
J. N. Burr, Mt. Vernon.	M. Thompson, Mt. Vernon.
A. Dunlap, Springfield.	G. W. Boyd, Xenia.

The hour for adjournment having arrived, the President, Dr. M. B. Wright, made a few remarks on the present meeting of the State Society. He said the attendance was much larger than could have been expected in these troubled times—embracing representatives from all parts of the State; the proceedings had been characterized by a high-toned, courteous demeanor amongst the members; the papers read were calculated to reflect credit on the profession.

On motion, the Society adjourned.

M. B. WRIGHT, *President.*

T. B. WILLIAMS, W. W. DAWSON, } *Secretaries.*

Prize Essay.

THE Ohio State Medical Society, in pursuance of a resolution adopted at the meeting in June, 1860, will award a GOLD MEDAL of the value of fifty dollars for the best Essay, by a member of the Society, upon *The use of Anæsthetics in Obstetrics.* Each essay should be marked by a motto or device, and accompanied by a sealed envelop marked in the same manner, inclosing the name and address of the author. The envelop accompanying the successful essay will be opened at the time of the award, during the session of the Ohio State Medical Society at the White Sulphur Springs, in June, 1862. All essays designed for competition are to be forwarded before the 1st day of April, 1862, to M. B. WRIGHT, M.D.,

Cincinnati, O.

ADDRESS OF THE PRESIDENT.

By H. S. CONKLIN, M.D., of Sidney, O.

VALEDICTORY ADDRESS.

BY H. S. CONKLIN, M.D., OF SIDNEY.

Gentlemen of the Ohio State Medical Society: — Called, as I was most unexpectedly to myself at our last meeting, to be your presiding officer for the year that is now at its close, I accepted the position with mingled feelings of diffidence, embarrassment and gratitude—gratitude for the confidence which such selection suggests; diffident and embarrassed from the fact that the active duties of the practitioner give him but few opportunities for qualifying himself for presiding over such a body as this—a body of gentlemen composed of the learning and genius of the medical profession of the State of Ohio. It is an honor that would be degrading to seek; to decline it would savor strongly of affectation.

It has been the custom, as you all know, for the presiding officer when about to retire, to present something for the consideration of the Society, and in obedience to this custom, and with your permission, I will present a few thoughts, desultory though they may be, which the times and the circumstances which now surround us have suggested.

In greeting you, gentlemen, upon this our annual gathering, I would that I could cast my eyes around me and behold nought but the emblems of peace, order and happiness. Alas, how sad are the changes which have overshadowed our land since we parted in this hall one year ago! Then Peace, that angel of mercy, was smiling upon and blessing us all; now "grim-visaged war" treads our land and holds us all in his control. Stern necessity has given him the empire: may he rule in wisdom and in moderation; and oh, may the time soon come when Peace, gentle Peace, may return from her banishment to again take us

under her guardianship, and bind us forever together with the silver bands of love and good-fellowship.

We are for the first time in political troubles, and the attendance here to-day—the adjournment of all our national scientific associations, and many of our local and State societies, show how much we have been influenced by these troubles. In Europe, where such convulsions are common—are indeed of frequent occurrence—medicine, with its kindred sciences, rises above them: it has ceased long since to be affected by them: it pursues ever its own highway, above the shock beneath. So may it be with us. Whilst thrones tottle and fall, and whilst one dynasty succeeds another, its march is onward: its investigations never cease; the great book of nature is studied, leaf after leaf, and the lessons of wisdom therein taught are applied to man's restoration and happiness. Shall it not be so here? Whatever may be the future of our country, may we not place the science of medicine far above the reach of political changes and political influences? It occupies this exalted position now, and it will be, I know, our desire—the desire of our Society and of the profession of our State—to ever retain it upon this high vantage ground. Then we may claim for medicine a station not accorded to any pursuit, save that one which is above all else, each true minister of which, far removed from all sordid influences—from all earthly interests, stands with one arm around his flock, and with the other he points them to the immaculate Christ.

To attain the high position to which we aspire, we must look well to ourselves, individually and collectively—as physicians, and as a State Medical Society. The times demand a most thorough self-examination; and with this view, I propose to make a brief review of the *present condition of the profession in our own State—a review of the history, present status and legitimate objects of this Society, the qualifications of candidates seeking admission, and the duties of its members.*

As this Society is the legitimate representative of the profession in the State, the condition of the one is a fair index of the condition of the other. I think that I will not be accused of vain adulation, when I assert that the profession of Ohio will compare favorably, in all that goes to make up a true, a dignified, a learned profession, with that of any State in the Union. There are some points in its history, as we

shall see hereafter, of which we may well feel proud. The medical gentlemen of the State were first called together in a convention, and for a long time continued to meet yearly in this way, until, to insure a more perfect organization, the delegates, in 1846, formed this association. Heading the original call, and for years a most useful and laborious member, was that man of whom Ohio is so justly proud. Dr. DANIEL DRAKE not only shed lustre upon his own State and nation, but upon the entire medical profession. *A benefactor to his race, his fame belongs to no country—he is immortal.*

It was through the instrumentality of this organization that Ohio was induced to take the lead in the erection and support of *asylums for the insane, the deaf, the dumb,* and *the blind.* To-day, look at the achievements! Instead of lunatics being confined in prisons and strait-jackets, in the depths of misery and in an utterly hopeless state, four magnificent institutions now do honor to our Commonwealth, and stand as grand monuments to the better part of man's nature. Within their walls, hundreds of insane persons have been restored to reason, to the embrace of friends, that must have, but for these institutions, lingered on in a worse than living death. How the true physician's heart swells and throbs with pride in the consciousness that he belongs to a profession capable of such achievements! Ah, gentlemen, one moment of such pleasure compensates one for many a day's hard and oft unrequited toil. When we compare such fruits as these with the empty vaporings of the empyric, with the curses of his deceived and often fatally injured victims, we can realize the difference between a false and a true life—and the value of that good old adage—"Honesty is the best policy." It teaches us that truth is better than fiction, that honor, an unswerving regard for what is just, and a conscientious treatment of those who confide themselves to our care will always in the end bring their reward.

Thus we see something of what this Society has accomplished directly for humanity; the good it has done indirectly, no man can tell—the great record above will in the end unfold and make manifest all this.

What has this Society accomplished for the profession? The volume of Transactions, published yearly, contains much that is valuable and worthy of preservation. Our yearly reports, if they develop nothing

new, present to us the status of the various departments up to the time. Occasionally, original observations are made which add inestimably to the resources of medical science. As an illustration of original research, without designing to be invidious, we may refer to Prof. M. B. Wright's Prize Essay on "Cephalic Version." Prof. W. has demonstrated to the profession that shoulder presentation, one of the most dangerous accidents, can, by manipulation, be changed to a natural position, a position comparatively harmless. This is certainly one of the most important contributions which has been made to obstetric science within the last quarter of a century.

Such are some of the fruits of our organization. Who, then, shall say that this Society was founded in vain? No, it has already realized some of the highest objects within man's reach. Objects, the contemplation of which make one's heart throb with pride in this noble exhibition of human nature, and swell with gratitude to the Great Giver of all good—to Him who has enabled us in our organized capacity to accomplish so much for our suffering fellow-men.

Prominent among the objects of the Society, was the cultivation of a more intimate acquaintance among physicians residing in remote parts of the State—the fostering of a kindly feeling and good-fellowship among its members, and the recognition of the proper principles which should guide and direct the intercourse between physicians—in other words, the development and establishment of those courtesies so essential to professional life, to professional improvement, and to the pleasure of professional intercourse.

Another of the most important objects has been the protection of the profession and the people against quackery. In this respect, however, our efforts have comparatively, if not entirely, failed. But little ought to have been expected—less has certainly been accomplished. Unfortunately, as long as men can be found who will practice duplicity, they will find dupes to victimize. We can not hope to rid the world of quackery, but we may keep it out of our own profession. To do this, we should be untiring in our efforts; we should ever be on the watch-tower, so as to shun the very appearance of the dastardly intriguer—the insidious charlatan.

Who are entitled to membership in this Society, and what are their

qualifications? These are vital questions, for upon their proper decision the character and usefulness of our organization depends. They are questions, too, which have to be passed upon at every meeting, and upon every applicant for admission. Here, we may have been remiss—here, in the future, let us exercise a renewed vigilance. The views which I shall present, to some, may seem to be too censorious, but rest assured that they will be conscientious convictions—not prejudice—not partisan—but, so far as I am able, they shall be impartial and just. We can not exercise too much care in the admission of new members. If we have been remiss in this, let us at once retrace our steps. It is not sufficient for membership that the applicant have the title of M.D.; there are other qualifications which he must possess, those higher attributes which go to make up the character of the gentleman as well as the physician. These qualificatians may all be summed up in the one word, HONOR. A practitioner of medicine, whose life and intercourse with his neighbor physicians and his patients are not guided by this principle, is an object of commiseration and contempt. As a man, he is to be shunned and suspected; as a physician, he is dangerous in the extreme; for it requires a much lower degree of moral depravity to make a dishonest physician—one who knowingly deceives those who place their lives in his hands—than is found in any other species of villain.

Medical colleges have much to do in qualifying, morally as well as professionally, young gentlemen for membership amongst us. The science of Medicine is so great, so extensive in its researches, that no individual can afford the means that are essentially necessary to its proper prosecution. To collect these means, and to furnish facilities for investigating the various sciences of which medicine consists, medical colleges are founded. Supported as these institutions are by the members of this Society, their organization, their standard of ethics, their teachings, the spirit which they infuse into their students, become legitimate subjects for our scrutiny, for our investigation. If we find them worthy of the high position which they have assumed, let us indorse, encourage, and patronize them. If, however, we find any one of them unworthy—untrue to the honor and dignity of the profession—poisoning and perverting the mind of the young man ere he receives his de-

gree, preparing him to take a low and groveling stand in the beginning of his professional life—should we be silent?—should we withhold our condemnation? No, gentlemen! Upon this subject we must speak in terms not to be misunderstood, or our profession will be overrun and prostituted by a class of men who, by their ignorance and stupidity, would disgrace the humblest pursuit.

An unfortunate day would it be for our profession were all our medical colleges to open wide their doors and invite "all manner of men" to come and be made doctors—to say to those who are too indolent and worthless to earn the necessary means: Come to us and we will teach you for nothing, or for a mere nominal sum. Were there none but honorable men in the world, such an appeal would be harmless, for an honorable man would scorn to be made a pauper while prosecuting such a science. Unfortunately, however, all are not thus highly organized, and such an offer reaches those who are too indolent to earn, or too sordid to spend what is sufficient to defray the expenses of a respectable medical education. Such men are thrust upon the profession to degrade and disgrace it; they are thrust amongst us and, in claiming to be our equals, we hang our heads in sorrow and in shame. They have been taught for low fees, or for no fees at all; can it be supposed that they will practice upon a different code of ethics? Will they not necessarily follow the example which has been set before them, and seek patronage as the establishment which sends them forth seeks students, by underbidding, and by all the disgraceful expedients which must be resorted to by men who seek business, not from merit, but because they are willing to degrade the profession by working cheaper than the honorable and dignified practitioner?

We are sorry to say that *this is no fancy sketch—that the picture is drawn* FROM *and* TO *the life*. We have such an institution as we have described, fortunately but one, in our midst—organized by honorable but, in this respect, sadly misguided men.

Here it may be well to remark that nothing which we may say in our strictures should be interpreted personally. We desire to enter our protest against the system, not against individuals. Already the disastrous results which we have portrayed have been realized, fortunately, however, to but a limited extent, as the system has been but recently adopted.

And we do most sincerely hope that it is an error of judgment which, upon mature reflection, may be corrected, and our noble profession, with its glorious history, upon every page of which is recorded the benefits which it has conferred upon mankind—around every period of which is hung blessings to the sick and suffering, and every honorable member of which is entitled to the laurel wreath of the true hero saved from farther injury, from deeper and more lasting disgrace.

Once let our profession be filled by men of no character, of no pride, of no love for medicine but as it furnishes them a livelihood; by men of no dignity, by those whom society sees are, in all the accomplishments of the refined, in all the acquirements of the educated, and in all the courtesies of life, inferior to the clergyman, the lawyer, and even to the intelligent artisan, then, the prestige which learning has every where given us is gone, and with the loss of this prestige we cease to be even respectable. A profession no longer respected for its great learning, for its army of true, patient, and devoted laborers in the great field of science, it will be degraded to the level of the mere charlatan—cupidity, not science, will be its aim—money, not blessings and relief to the suffering, its highest objects, and its course, which, since the days of Hypocrates has been onward and upward, would be reversed and descend gradually until it reached the level of the superstitions of the masses and the recipes of the nostrum vender. Must these things be? Can we, who now see the danger, the tendency to the prostitution of our time-honored profession, be silent. No, let us speak out whilst this innovation is yet in its infancy, before the profession is overrun with a worthless throng, and all the more promising young men of our country driven into other pursuits.

It has been said that this free system gives the poor young man an equal chance with the rich. Away with such sophistry! To educate a poor young man here and there must we pauperize the whole? What student of the present day can have more obstacles to surmount than hundreds of distinguished medical gentlemen of the present day had? Was such a system necessary to develop such men as Drake because he was poor? No! We fear it is a disgraceful plot to draw crowds of students that could not be drawn by a fair and legitimate contest. Now, gentlemen, as we have just said, is the time for action—we must

close the doors against all who will not adorn, refine, and extend the science—we must cling to and cherish still more the high achievements of our profession in the great battles of life—we must rally around its pure and elevated standard, around which are entwined the emblems of faith, truth, and honor. By the names of the great men whose lives have been devoted to its advancement—by the memories of the past, and for the sake of the future, let us again consecrate ourselves to our noble calling, to our mission of mercy to the poor, the sick and the distressed, to the broken in body, to the bruised in spirit, ever keeping in view the precepts and example of Him who was the Great Physician.

To our brethren who differ with us upon important points, upon subjects involving the best interests of the profession, we should accord the same honesty of purpose which we claim for ourselves. We should seek to convince them by reason, rather than change them by censure and denunciation. We should not withhold our disapprobation, but we should give it in such a manner as to convince and not offend.

This Society is to-day, and for the present, in our hands. Its character, its usefulness now and in the future, will depend upon us; we must sustain it in vigor—we must leave it untarnished to those who may come after us. To them, our record will be open, it will be thoroughly scanned and criticised; let us see that it is a record of truth—that it is a record which may inspire those who may examine it with a determination to keep this Society ever on the advance, to carry it on to still higher attainments, and to ever preserve its pages from the footprints of the knave and the empyric.

And now, in conclusion, we reiterate the remark heretofore made, that we must raise our profession above all the disturbances, all the changes in the body politic; that, in being true to ourselves and to science, we may be true to the great cause of humanity which we serve so efficiently. For a time, society might dispense, without great detriment, with almost any occupation or profession but ours. We must advance. whatever or whoever else may recede. In the hour of trial, of danger, of disaster, of revolution, of war, all avocations cease, whilst ours is more and more in vital demand, and of still greater importance. At such times—and we have almost lived to see them—the mission of our profession seems almost divine; all eyes turn to it for succor and

assistance. The soldier on the field is saved from a lingering, torturing death. The Government may gather troops by thousands, but without the sleepless vigilance of the medical officer, they are swept away by disease, pestilence, and contagion. Communities, and still more armies, are subject to a thousand unseen but dangerous foes, that no one can detect and successfully meet, save the learned and faithful physician. Why may we not be proud to belong to such a profession? Indeed, who would not be, enshrined as it is, in the affections of the good and great in all times and in all countries!

ERUPTIVE DISEASE.

By G. W. BOERSTLER, of Lancaster.

ERUPTIVE DISEASE.

REMARKS ON THE ERUPTIVE DISEASE OF APRIL, MAY, AND JUNE, 1860.

BY G. W. BOERSTLER, OF LANCASTER.

THE first case occurred in Mr. Plageman, aged 63, a German by birth, living in Carroll, a town situated on the Ohio and Erie Canal, in Fairfield county. He and wife had genuine variola by innoculation, in Germany, the cicatrices bearing all the evidence of variola. Late in April he was taken with fever, and on the fourth day he had pustular eruptions, filled with serum or lymph, which could not be determined by the history given me. The eruptions appeared simultaneous on his face, upper and lower extremities. During the progress of maturing of the first pustules, a successive crop of other pustules appeared, many of which went on to full maturity, whilst others were interrupted in their development and dried off. The greater number matured in four days, and dessicated in eight days. Dr. Aldred, who treated Plageman and who visited with me, in June, two families living in the same neighborhood of the old man, upon carefully examining the eruption in these families and noting its progress, said the disease was identical with that of Plageman. In one family four had the disease, three of whom were unvaccinated, one vaccinated, and in him the disease was greatly modified. In two who were not vaccinated, the disease was severe, concrete in one, confluent in the other; in the third, very mild. In the other family, two children were promptly vaccinated, and the vaccina progressed to the eighth day, when it was arrested by the prevailing eruption, and both patients were covered with pustules in the confluent form. On the fifth day these pustules were filled with lymph, broad base, and a pale red ariola, and umbilicated at the apex. The same phenomena of a succession of pustules was here present as in those of the earlier cases. A relative visited one of the families in Carroll, and in four days

after her return to her home in Lancaster, she had the same pustular disease, which was communicated to four children in the house. Three had it distinct, one confluent. Neither mother or children had been vaccinated.

In a remote part of our city a young girl, aged 18, took the disease. No communication had taken place between her and the diseased family, nor with any one who had been there. She had visited Columbus a week or ten days before, but heard of, or saw no one with skin disease. This young girl had been vaccinated several years before, the cicatrices presenting the ordinary depression and stellated points of genuine vaccina. This girl had the eruption in the confluent form, and after dessication she was pitted. Three other members of this family had the disease in its concrete form. All had been vaccinated, as was believed, successfully, their arms presenting the usual evidence of genuine vaccina. No other cases occurred in our city in 1860. In 1861, I was requested by a medical friend to see a lad ten years old, who, it was feared, had variola. Upon an inspection of the case (the fourth day of the eruption) in its confluent form, I recognized its full identity with the disease of 1860, and on inquiry, we ascertained that eight or ten days before he had been exposed to the poison of a case of varicella. Some weeks after seeing the lad, I was again desired to visit a case of what was believed one of confluent variola. This presented all the phenomena of the bad cases of 1860, and the lad's, 1861. The patient was an old, broken down woman of the pave, and she succumbed. In the same house, a young man had the disease in its confluent form—he had been vaccinated many years previous. A little girl in this house also had the disease in a very mild and concrete form. She had been vaccinated four or five years before. In the section of our city where the lad had the eruption this year, some four or five contracted the disease, two of whom died—one, a drunken fellow, and his wife.

Being in Lexington (a town on the railroad 22 miles east of Lancaster), early in the spring of this year, I was requested by several medical gentlemen to see a girl, twenty years old, who had a confluent eruption of four days, and the Faculty, after full consultation, decided it was not *genuine variola*. In this, in my judgment, they were right. From this case the disease spread, and assumed an epidemic form in the

surrounding country. Owing to the judicious treatment of the Faculty, three cases only proved fatal. All the cases rapidly passed through the vesicular, papular, and pustular stages, and at no period was pus detected; the pustules preserved the umbilicated form throughout, and, upon drying, they formed a thin, light, brownish crust. After complete dessication, the skin under the pustules was elevated over the surrounding surface. In several of the cases pitting resulted, owing, doubtless, to the breaking or scratching of the pustules. In no case had we that unmistakable odor (the "Bene odorata," as facetiously termed by Hernschwaud) of variola; nor did I see, or learn from medical gentlemen, a single case where those dangerous complications arose in the period of suppuration in variola which so often result fatally; nor did a single case present any of those secondary affections so frequently resulting from variolous inflammation, such as opthalmia, opacity of the cornea, deafness, glandular enlargements, pulmonary diseases, etc In short, no suppurative fever followed in any case.

The similitude between this disease and variola, easily misleads the medical practioner who has not seen small-pox to believe he has to deal with that loathsome and fatal disease; and through him, public alarm is created, to the injury of the mercantile and manufacturing pursuits. That the epidemic of 1860 and 1861 was varicella umbilicata, I have no doubt. The eruption, from its inception, its progress and termination—all the concomitant symptoms, leave not a doubt on the mind of any one who has seen and properly scrutinized the two diseases; the discrepancy will be manifest to any discriminating mind. I am not unaware of the hypothetical opinion of some systematic writers, that umbilicata varicella is a modified form of variola. When my mind can be brought to this conclusion, I will be prepared to believe that the virus of small-pox can engender syphilis—rubiola produce scarlatina—hydrophobia, pertussis, etc. Whenever disease loses its specific character I can no longer recognize it. If our common miasmatic fevers change into typhoid, typhus, or any other diseases, I will expect to see the oak and the walnut, which have been growing side by side for centuries, to become metamorphosed, lose their specific character, and forever become unrecognizable. Nature's laws are fixed and immutable.

EXPERIMENTS UPON INFERIOR ANIMALS

TO DETERMINE IN WHAT MANNER

CHLOROFORM PRODUCES DEATH.

By H. CULBERTSON, M.D., of Zanesville.

EXPERIMENTS UPON INFERIOR ANIMALS

To determine in what manner Chloroform produces Death.

BY H. CULBERTSON, M.D., OF ZANESVILLE.

I APPEAR before you to-day for the first time as an Essayist. In so doing we should be treating you with great disrespect did we not apologize for the imperfection of the present effort; as we would also do the subject great injustice, did we not ask for it your earnest consideration.

In a profession like ours, where the preservation of *human life* is the great object, the smallest scintillation of *medical truth* should be received, and its value most carefully determined.

Thinking that possibly we might discover something by investigation of the action of chloroform upon the lower animals, which would lessen the number of deaths from this agent when exhibited to man, and hoping to show more clearly how this anæsthetic produces death, in December, 1857, these experiments were commenced, and finished but a few weeks since. We are fully aware that others of just celebrity have experimented with a view to determine the effects of this agent upon the inferior animals, but these experiments, let their value be little or much, are not based upon the opinions or acts of others. They have been made to determine for ourself the effects of this powerful agent, without any preconceived ideas or opinions. Allow me, therefore, respectfully to ask your attention to my subject, viz.:

"*In what manner does Chloroform produce death?*"

To determine this, experiments on dogs and pigs were performed, and the effects carefully noted.

EXPERIMENT 1.—Took a dog about one year old, kept him on spare food twenty-four hours, and then gave him chloroform by lungs until he died.

Symptoms.—Ptyalism, resistance, excitement, stupor, followed by

excitement, tremors, slight spasms of the muscles of the right thigh; again, great excitement, stertorous breathing, puffing of cheeks, dilated pupils, and apparent coma. Pulse accelerated, becoming less and less full, until thready, and as death approached it ceased at the wrist. Respiration became more frequent and less and less deep until breathing ceased, as well as the action of the heart.

Post-mortem.—Immediately after death: On opening the chest, the lungs were found collapsed, and somewhat engorged with blood, yet they floated on water. The heart was distended on both sides, mostly on the right, with dark fluid blood. The vessels of the membranes of the brain were distended with blood, but the substance of this organ showed only a few red points. Some fluid was seen in the lateral ventricles. The membranes of the spine were injected, but its substance was unaffected. The trachea and mouth contained a frothy mucus. The abdominal organs were turgid with blood. This case was examined, as were most of those which will be presented, immediately after death, in order to determine the exact condition at the moment of death, as this might be much modified by capillary action after somatic death, and thus the lungs and heart be found more distended with blood than at the time of death. The symptoms developed in this case are typical of those shown in the following, and if they are any different in the future experiments, the variation will be noticed.

Remarks.—The brain in this case seemed not to lack blood, or any other organ in the body. The substance of the brain does not seem to be unduly supplied with blood, sufficient being present to promote nervous action, and consequent motion of the heart and lungs, if that fluid were of a healthy character.

Experiment 2.—A small, thin dog, two years old, was chloroformed by the lungs. During inhalation much the same symptoms presented as in the last case. The brain, lungs and heart symptoms the same. Death ensued in fifteen minutes after the first inhalation. The body exaled chloroform. The body and limbs were relaxed, the ears erect, and the pupils dilated.

Post-mortem.—Immediately after death: On opening the chest, the lungs collapsed, but on artificial inflation, they presented a natural ap-

pearance. The heart was much distended on the right side, some on the left, with dark fluid blood. The veins of the stomach, bowels and spleen were engorged. The brain presented the same appearance as in Case 1, excepting that there was a little more serum around the organ, and in the ventricles, in Case 1.

Remarks.—This case is similar in every respect to the first, except that the lungs were not so much engorged, and also in the fact that there was a little less serum in the ventricles of the brain in Experiment 2.

Experiment 3.—A pig, four weeks old, was chloroformed until dead. A proper supply of air was admitted during the exhibition of the anæsthetic. The pulsations of the heart became more frequent, the respirations more rapid, and less and less deep, then slower (and the heart's action also) and stronger. At 12½ minutes the respiration ceased, but the heart's action continued. The chloroform was now removed, fresh air allowed, and the abdominal walls pressed up and back, and the pressure quickly removed. This process was repeated several times, when respiration began, slow at first, aided by the abdominal pressure; then rapid, then more deep and slow, and at nineteen minutes the animal raised its head and opened its eyes. The chloroform was again administered, after which respiration gradually ceased, and two minutes afterward the heart its motion. Muscular spasms of the extremities were observed, and also the symptoms mentioned in the two preceding cases.

Post-mortem.—Immediately after death: While opening the chest, spasms of the pectoral and intercostal muscles were observed. The lungs were collapsed and uncongested. On dividing the internal jugular, after having exposed the heart, the blood flowed from the right auricle and ventricle, and the walls of the former began to contract, and continued to act thus about one minute. None of the other walls of the organ contracted. The heart was distended mostly on the right side with dark fluid blood. The surface and membranes of the brain were engorged with blood, as well as the blood-vessels of the abdominal organs, the latter to a greater extent than those of the other cavities of the body.

Remarks.—That the abdomen should contain more blood than the other cavities, and this to an unnatural amount, would seem to point to failure of the heart as the cause of death; or in other words, that death here is a form of syncope. But this conclusion must not be too hastily drawn, as the succeeding cases will dictate. The lungs here ceased to act before the heart. This would seem to indicate paralysis of the lungs as the cause of death. But this point needs careful consideration. If the lung-structure were only locally paralyzed, and the motor-nervous influence continued to be sent down through the spinal accessory, the phrenic and intercostal nerves, and the heart continued to act, the blood should flow on to the lungs, and they be found distended with blood. But such is not the true state of affairs, for the heart, too, seems to be paralyzed and always distended, as though it labored to expel its contents, mostly fluid, uncoagulated blood. The nervous influence sent down from the medulla oblongata seems wanting. This may be caused either from the lack of healthy blood, its natural stimulant, in the lungs, or the absolute presence of chloroform in the circulation at the heart, or in the medulla, at its motiferous centre. Which it is, or if it be both, it is our object to determine. The action of the right auricle after death, and its commencement immediately after division of the jugular, and the want of motion in the heart-walls, would seem to indicate the irritability of the walls of the right auricle last affected and last overcome. And also that, by the distension of its walls, its power to contract was temporarily removed, but that when the blood was allowed to flow out, the obstacle was removed, and contraction was the result from the stimulus of the external air. This leads to the conclusion that local irritability of this portion of the heart was not annihilated, and therefore, if the right ventricle or the left-heart are not at fault, would point to some other region of the body as the source of death. It is well known that the heart is mainly supplied with nervous agency from the sympathetic, and that it receives several filaments from the pneumogastric; consequently this organ will be mainly influenced by the chloroform entering the circulation and impressing it locally. The lungs, too, are locally chloroformed, but motor agency is sent down from the medulla by the stimulus of the blood in it, until it, too, is chloroformed, when the pulmonary organs cease to act.

This case presents for consideration another fact, viz., that restoration may take place, by removal of the chloroform and the admission of pure air, aided by abdominal pressure, before the heart has become quiescent, and after the lungs have ceased to act. Whether this is a common result will be seen as we progress. Another point is clearly shown, that the lungs became quiescent two minutes before the heart.

EXPERIMENT 4.—A pig, five months old, was given chloroform by lungs, without admitting much air, and in half a minute respiration ceased. We omitted to notice if the heart still acted, but feel convinced that it did. Waiting one minute to allow respiration to recommence, and finding that it did not, we pressed upon the abdomen as in the last case, and shortly respiration began. We then cut down over the heart in an intercostal space to the pleura costalis, when through this membrane its motion could be distinctly seen. Subsequently we cut down over each lung to the same membrane, but, unfortunately, penetrated both pleural cavities. The right lung collapsed, because the opening was so large. The animal resuscitating, the left lung could be seen playing up against the walls of the chest. The chloroform was now given again for about four minutes, respiration ceasing twice, but beginning again after the anæsthetic was removed. The third time the agent was exhibited, respiration ceased, the heart continuing to act persistently until one and a half minutes after the lungs became quiet.

Post-mortem.—Immediately after death: The lungs were collapsed and uncongested. The heart was distended on the right side with dark fluid blood. The walls of the right ventricle contracted after division. The large veins of the heart, as usual, distended. The other cavities of the body not inspected.

Remarks.—This case is interesting because of the rapid cessation of respiration, in half a minute, and calls to mind those instances where death has occurred in the human subject, after a few inspirations, ere the agent could have traversed the rounds of the circulation, and reached the brain. It is probable, in this case, that the chloroform reached the lungs, and that when it was removed, and the stimulus of the external air allowed (the motor-influence still continuing to be sent down from the nervous centres), they began to act, and continued to do so

until the nervous centres were locally palsied by the agent. It is plain, too, in this case, that although the animal died by the agent, that the irritability of the heart (right ventricle) was not entirely lost, for when the walls of that cavity were incised, the muscular structure began to contract imperfectly; but nothing of this nature was observed in any other part of this organ. This would seem to point to other organs as the seat of the defect, and not to local anæsthesia of the right heart, although this organ must be measurably benumbed by the presence of the agent in its cavities. But if the chloroform enters the blood, then in the natural course of the circulation from the lungs to the left side of the heart, the left side should be the most impressed with the chloroform, and therefore more dilated than the right heart. Yet this does not seem to be the case. Clots in the left side are *not uncommon*, and this side is but little dilated, yet the blood is about as dark as in the right cavities of this organ; and, moreover, we have never observed any muscular motion of the walls of the left side, consequently the systemic heart may be most at fault, and thus lead to the death of the subject. But this does not conform with the fact that in these experiments we have never known the heart to cease acting before the lungs, it always being the last organ in the body to cease its motion. And therefore if it continue to perform its duty when the lungs have failed, it can not be the organ most at fault.

It must be remembered that the right side of the heart is always much dilated from the effects of chloroform, which is common from obstructed lung-circulation from other causes. This presents another argument against heart-fault, and points rather to the lungs as the seat of the defect. But if the lungs are at fault, how comes it that they continued to act after both pleural cavities had been opened? How under such circumstances could they overcome the atmospheric pressure, and the animal resuscitate twice when the chloroform was removed, if the cessation of respiration was the sole cause of death? And again, if respiration was alone defective, why is it after the heart has become quiet that the *lung-action* can not be restored by artificial respiration? The answer to these queries would seem to be because some other organ than these is in some manner concerned in the death.

EXPERIMENT 5.—A fat pig was chloroformed, and in half a minute was insensible. In order to determine if the lungs were expanded before the chest was opened, we cut down to the pleura, but, unfortunately, through the right membrane. Respiration immediately became more rapid. Soon, however, the breathing grew less quick, and the animal became more conscious. On cutting down to the left pleura, and accomplishing it without penetration of the left thoracic cavity, the lung was seen fully expanded. In a few seconds, however, the animal was seen to be dead, probably because too much chloroform had been given, where there was but one lung to support life.

Post-mortem.—Fifteen hours after death: The right lung was collapsed, the left still expanded; but when the left side of the thorax was opened, the lung sank down less than usual. The right lung was pale and gave no blood on incision, while the left was dark red, and considerable blood flowed on cutting it. The heart was largely distended on the right side, and but little on the left. On taking out the heart and lungs in such a manner as not to lose a teaspoonful of blood, and weighing them together and then each separately, the following was the result:

Weight of heart	1800 grs.
" " left lung	1320 "
" " right lung	1680 "
" " heart and lungs	4800 "
" " " to lungs	3 to 5
" " " left lung	5 to 11
" " " right lung	15 to 14
" " right to left lung	14 to 11

We notice in this case that when the right pleural cavity was opened, the same phenomenon occurred as in Case 4, viz., increase of consciousness. Can this be the result of more blood being thrown back upon the heart in a given time, producing greater energy in its contraction, by stimulus of distension, and therefore more blood cast upon the brain? Or is the effect due to mere nervous impression, from the cold air in the chest, acting here as does cold water when applied to the face to restore from the anæsthetic state? Which of these queries are correct, we can not state. It is doubtful, too, if the fact of the occurrence will prove of any practical value.

EXPERIMENT 6.—A pig, four months old, was chloroformed, and in half a minute was insensible. On cutting down to the right pleura without dividing the membrane, the lung could be seen inflated and playing beneath. The anæsthetic was again given until the lungs ceased to act. The heart continued to act one minute after respiration had ceased. As is usual, the respiration and motion of the heart became more and more rapid before death.

Post-mortem.—Lungs partially collapsed. Heart distended with dark fluid blood. Fifteen hours later the lungs were still more collapsed than at the time of death. The heart and lungs were then removed and weighed as in the previous case, and the following is the result:

Weight of heart	1110 grs.
" " left lung	930 "
" " right lung	1260 "
" " lungs and heart	3300 "
" " heart to lungs	1 to 2
" " " left lung	19 to 16
" " " right lung	19 to 21
" " right to left lung	21 to 16

Both lungs float on water, the left the highest. On incision and pressure, more blood flowed from the left than the right lung, but still very little from either; which may be accounted for, from the walls of the right ventricle having been incised soon after death, permitting the blood to flow from the heart and large blood-vessels, and thus preventing the accumulation of blood in the lungs.

I should here state that the animals experimented upon in Cases 5 and 6, both weighed the same amount.

This experiment closely resembles the previous one in the time necessary to induce anæsthesia, and the period when the post-mortem was made, viz., fifteen hours after death. But the great difference in the two cases is, that in the last the right ventricle was opened immediately after death, which was not done in Experiment 5 until fifteen hours after the cessation of life. It is, therefore, plain that the heart and lungs should weigh most in Case 5, which we find to be the fact. Thus the weight of the heart in Case 5 is 1800 grs., and in Case 6 it is 1110 grs.—a difference of 690 grs., lost by incision of the right ventricle in

Case 6. Again, this difference may be further shown by comparing the weight of the lungs. Thus in Case 5, the weight of the left lung is 1320 grs., and in Case 6, 930 grs.—a difference of 390 grs. The right lung in Case 5 weighed 1680 grs., and in Case 6, 1260 grs.—a diversity of 420 grs. Thus considered, the whole difference in the weight of these organs is 1520 grs. Is this from the incision of the heart, or is it because the capillary action was cut off in Case 6, thus preventing the flow of blood into the lungs?

To determine this, notice, if you please, that 690 grs. are lost from the heart in Case 6—390 grs. from the left, and 420 grs. from the right lung; consequently most of the blood is lost from the heart. It seems clear, however, that the amount of blood in the lungs in either of these cases could not have produced death; for on comparing the weight of the body in both cases (about 10 lbs.) with the lungs, the latter will be found comparatively light. It would rather seem that the blood is unequally distributed between the heart and lungs, the heart containing the largest relative quantity.

Experiment 7.—A puppy, six weeks old, weighing 2 lbs. 9½ oz. Troy, was chloroformed as usual. It continued to breathe after the anæsthetic had been administered five minutes, when the agent was removed. In four minutes more the animal resuscitated, and barked. The chloroform was again given, and in five minutes respiration ceased; and in two and a half minutes later, sixteen and a half minutes from the commencement of the experiment, the heart was quiescent.

Post-mortem.—Immediately after death: On looking through the pleura costalis, both lungs could be seen inflated. On opening the pleural cavities, both lungs collapsed, and they were pale in color, crepitated but little, and no blood flowed from them on incision. The heart was most distended on the right side.

Weight of body	15,980 grs.
" " heart	210 "
" " right lung	150 "
" " left lung	120 "
" " body to heart	76 to 1
" " heart and lungs	59 to 1
" " right lung	106 to 1

Weight of left lung	133 to 1
" " heart to lungs	7 to 9
" " " left lung	7 to 4
" " " right lung	7 to 5
" " right to left lung	5 to 4

This case may be compared to Case 5 with some propriety. Thus in Case 5, the lungs weigh more than in case 7 by 960 grs. All things considered, this shows a little congestion in the former case. This may be further shown by comparing the relative weight of the heart to the lungs in the two cases. Thus:

In Case 7 the relative difference in the weight of heart and lungs is two-ninths. In Case 5 the difference is two-fifths, which is a relative difference of seventeen forty-fifths greater weight in the heart and lungs of Case 5.

But as we do not know the weight of the body in Case 5, we can not compare this with Case 7 correctly. If the lungs in Case 7 contained relatively less blood, capillary action could not have had much influence on the quantity, else it would have been greater, at least proportionately equal, to the amount in the lungs of Case 5. This difference will be borne in mind in the consideration of the subsequent cases.

Experiment 8.—A puppy, six weeks old, which weighed 2 lbs. 9½ oz., was chloroformed by the lungs. At two and a half minutes, respiration ceased, and one and a half minutes later the heart was quiescent. When respiration ended the chloroform was removed, and several very shallow inspirations were observed, after which death ensued.

Post-mortem.—Immediately after death: The lungs were inflated until the chest was opened, when they were seen to be collapsed, but not so much shrunken as in the previous case. Their color was pink red. On incising the right lung, frothy mucus very freely flowed, but little blood appearing, yet more than was observed in Case 7. By cutting the left lung, a little mucus appeared, and much dark blood. The heart and large pulmonary vessel were much distended. The blood seemed to be more equally divided between the heart and lungs than in the other cases. The brain was but little engorged.

Weight of body	15,980 grs.
" " heart and lungs	960 "
" " right lung	360 "
" " left lung	240 "
" " heart	360 "
" " body to heart and lungs	16 to 1
" " " left lung	66 to 1
" " " right lung	44 to 1
" " " heart	44 to 1
" " heart to lungs	3 to 5
" " " left lung	3 to 2
" " " right lung	1 to 1
" " right to left lung	3 to 2

This case is interesting, as the weight of the body is the same as in Case 7, and also in the fact that, as the former required but four minutes and the latter sixteen and a half before the heart ceased its motion, we should expect to find the lungs more heavy in Case 7, because the heart longer continued to cast blood into these organs. Yet this would not seem to be the case, judging from the pale red appearance and collapsed state of the respiratory organs in Experiment 7. On the contrary, we find in Case 8 but four minutes necessary to destroy the animal, and the lungs more congested than those of Case 7 This difference will be made still plainer by reference to the respective weights of the heart and lungs in the two cases. Thus:

In Case 8, weight of heart is 360 grs.; in Case 7	210 grs.
In Case 8, weight of right lung is 360 grs.; in Case 7	150 "
In Case 8, weight of left lung is 240 grs.; in Case 7	120 "

A difference in the order of the table of 150—210—120 grains, in the weight of these organs.

This want of unity in the blood condition of the lungs in the two cases could not have arisen from the paralyzing effect of the anæsthetic, but must have been produced by acute congestion in Case 8. A further difference may be observed by noticing the relative proportion of the body to the heart and lungs in the two experiments. Thus viewed, these organs in Case 8 weigh 480 grains more than those of Case 7. It thus seems plain from these two cases, that a profuse chloroforming in a short period of time may induce congestion of the lungs, and also

that a limited exhibition of the agent may not, although it be continually given for a long time. The latter conclusion would dictate some other mode of death than congestion, while the former indicates a cessation of life by asphyxia. Thus far we may infer from the developments of these cases, that the presence or absence of blood in any quantity is not uniform in the respiratory organs, and therefore we may reasonably conclude that this anæsthetic has a direct effect, other than the impression of the circulation of the lungs. There may be paralysis of some other organ of the system.

EXPERIMENT 9.—A puppy, weighing 2 lbs. 6½ oz., was killed by pithing. About one drachm of blood was lost by the operation. The heart ceased to act one and a half minutes after the lungs.

Post-mortem.—Immediately after death: The lungs were expanded, until after the chest was opened, when they appeared pale, and also were slightly crepitant. Incision of their structure caused more blood to flow from the left than the right organ. The cavities of the heart were all full, but not distended.

Weight of body	14,460 grs.
" " heart	270 "
" " right lung	120 "
" " left lung	90 "
" " heart and lungs	480 "
" " body to heart and lungs	30 to 1
" " " heart	53 to 1
" " " right lung	120 to 1
" " " left lung	160 to 4
" " heart to lungs	9 to 7
" " " left lung	3 to 1
" " " right lung	9 to 4
" " right to left lung	4 to 3

The object of this case is to establish, as near as possible, a standard of the natural circulation resembling that which exists during life; so that the circulatory state of the heart and lungs produced by chloroforming, may be compared with the former, and thereby a truthful conclusion drawn as to the latter.

It will be noticed that respiration ceased before the heart's action,

and that the lungs were pale, collapsed, and absolutely, but not relatively, lighter than in Case 7. Thus it is clear that there could have been but very little congestion of the lungs in this case, although some blood flowed from them on incision. This will be seen more plainly by reference to the the figures. Thus, the weight of the body to the heart and lungs in Case 7 is as 59 to 1, and in Case 9 as 30 to 1, a relative difference of 29-59ths greater weight in the lungs and heart of Case 9. If this proportion be reduced to grains, it will be found that the heart and lungs in Case 9 are proportionally forty-six grains more heavy than those of Case 7. This does not indicate much congestion of the lungs in Case 9. Consequently, congestion could not have been the cause of death in either of these cases. Keeping this in view, we again refer to Case 7. Here the palsy began locally at the afferent extremities of the excitor nerves of the lungs and heart, and the agent traveling by circulation, was finished upon the medulla locally; while in Case 9 it began and ended at the medulla. The potency of the pithing in inducing *centrical palsy* accounts for the rapid death in Case 9, and the indirect circulatory connection between the heart and lungs, and medulla, for the long time necessary to produce death in Case 7.

This case may be compared to Case 8 with propriety. It will then be found that the heart and lungs, in proportion to the weight of body, are more heavy in Case 8 by 388 grs.; consequently the lungs in Case 9 must be unusually light, or in Case 8 much congested. We learn by the subsequent experiments, that they are much congested in Case 8, and that in Case 9 they are nearly natural as to the amount of blood in them. It will be remembered that the lungs in Case 7 are lighter than those of any other in which the chloroform was administered by the lungs, and therefore this will be a safe experiment to draw conclusions from as to the effect of the agent upon the respiratory organs, where there is no congestion of the same.

Again, to refer to Cases 7 and 9, we may notice that the lungs are the heaviest in Case 7, and that the heart with its blood weighs more than in Case 9 by 60 grs., and in proportion to the weight of the body, a difference of 46 grs. greater weight in the heart of Case 9 is presented. The nervous influence sent down from the medulla to the heart was cut off immediately in Case 9 by the pithing, consequently the heart ceased

acting as soon as the ganglionic nervous agency failed to be supplied to the heart with sufficient power to enable it to contract. No one will doubt that if respiration was suspended and the heart's action continued unimpaired, that after death the lungs would be found engorged with blood. But such is not the case here. The same agent impresses the heart as well as the lungs, either through the nervous or circulatory systems. Consequently, to correctly determine the effect of chloroform upon the circulation of the lungs, its influence upon the heart must be considered at the same time. On thus comparing Cases 7 and 9, we find the lungs and heart in proportion to the weight of the body, in Case 9, 46 grs. more heavy. This is but a small difference, and leads to the inquiry—Can there be any similarity in the mode of death in the two cases; or, in other words, as the pithing acts on the medulla, paralyzing it and all the parts with which it is connected, does not the chloroform act in the same manner upon this organ, after having passed through the circulation? Subsequent cases will shed more light on this point.

Cases 7 and 9 may be further viewed by comparing the weight of the heart to the lungs in the two. Thus:

Weight of heart to lungs in Case 9, is	9 to 7
Weight of heart to lungs in Case 7, is	7 to 9

The heart, as before stated, containing the most blood in one case, and the lungs in the other. This circulatory reciprocity may be again noticed by associating Case 5 with 9. Thus in the former the weight of the heart is to the lungs as 3 to 5, and in the latter, the relation is as before stated, as 9 to 7, a difference of about two-elevenths for the cases.

Experiment 10.—Took a young fat dog, weighing 8 lbs. 11 oz., and trephined over the right side of the medulla oblongata. After opening the membrane, ʒ ss. of chloroform was injected beneath them and upon the medulla. But little shock resulted from the entire operation. In two minutes, the animal was a little sleepy. At ten minutes, it having awakened, ʒ ss. more was thrown in. This produced some drowsiness. At twenty-five minutes, thinking the syringe did not inject all the chloroform, we rearranged the instrument, and threw in ʒ ss. of

the agent. At twenty-seven minutes, respiration nearly ceased, there being occasionally a shallow, almost imperceptible breath. At thirty minutes, the lungs entirely ceased to act; the heart, however, continued its motion until forty-five minutes, just fifteen minutes longer. As insensibility increased, the respiration became more and more affected, until when it ceased the animal was apparently comatose.

Post-mortem.—Immediately after death: The brain and its membranes were bright red on the right side, the color being deepest in the cortical structure. The left brain and membrane were pale. The ventricle contained but little serum, and the redness above mentioned was very faint in the region of the corpus callosum. The chloroform had nearly all disappeared from around the medulla. The lungs were expanded until the chest was opened, when they collapsed. On incising the left, blood flowed freely, and also mucus on pressure, but there was no crepitation. The right lung did not show so much blood on section as the left, yet more than is generally seen from chloroforming by the lungs, but still no greater than the quantity in Case 8. This lung did not crepitate, nor did it contain but very little mucus. Both of these organs were mottled and bright red in color. The heart was not distended.

Weight of body	54,360 grs.
" " heart	720 "
" " left lung	420 "
" " right lung	450 "
" " body to heart and lungs	34 to 1
" " " left lung	129 to 1
" " " right lung	120 to 1
" " " heart	74 to 1
" " heart to lungs	9 to 11
" " " left lung	12 to 7
" " " right lung	8 to 5
" " right to left lung	3 to 11

It will be noticed that the heart was not distended, but merely full, the blood having accumulated to a greater amount in the lungs. The object of this experiment was to determine if the chloroform by being applied locally to the medulla would produce anæsthesia of this organ, and thus induce death of the entire system; and also to obseve if the

effects of this agent so applied are similar to those resulting from chloroforming by the lungs. That the anæsthetic did not injuriously compress the medulla we are quite certain. This would seem to be proven by the fact that there was but little chloroform found around the medulla after death; some of it, therefore, must have passed down between the spinal cord and membrane, locally impressing this nervous centre. It is also probable that all of the chloroform introduced into the syringe was not injected.

If we compare this case to Case 8, it will be found that in proportion to the weight of the body, the heart and lungs in Case 8 are 495 grains the heaviest. It will be remembered that Case 8 showed much congestion of the lungs. If, however, we contrast the weight of these organs to the body in this and Case 7, we find they are more heavy in Case 7 by 13 grains, which is but a small difference. Comparison of Cases 8 and 10 show that the local effect of the anæsthetic upon the lungs produce more congestion of these organs and the heart than does the same agent applied as in Case 10.

It also is an interesting fact that the absolute difference in the weight of the heart and lungs in Cases 10, 8, 7, and 5, is large, being in the order stated 150, 240, 60, 1200 grains. Thus considered, there would seem to be a similarity in Cases 8 and 10; but really there is no analogy between the two. The difference shown may be accounted for by the greater congestion in Case 8 being brought about by the local action of the chloroform on the lungs; while in Case 10 the lungs receive constantly pure air, and thererefore they only suffer from the centrical palsy of the medulla.

The difference in the weight of the heart and lungs in Cases 8 and 5 is as 240 to 1200, a large diversity. But this is to be accounted for by the weight of the body being so much greater in Case 5. There was really but little congestion in the lungs of Case 5, and no doubt had we weighed the body in this case, it would have been found, in proportion to the weight of the lnng, about the same as that of Case 7. It will be noticed that there is more resemblance in the absolute weight of the heart and lungs in Cases 7 and 10, than in 7 and 8. Now 7 and 10 are paralytic in character. The last is wholly centric palsy, and the former partially centric and also eccentric. Case 8 presents a dif-

ferent pathology, being congestive, and consequently a marked difference in the weight of the heart and lungs is noticed in it.

Again, the relative weight of the body to the heart and lungs in Cases 9 and 7, differ but 46 grs., the lungs being the heaviest in Case 9. Now Case 9 is certainly paralytic, and therefore if the lungs and heart are so near alike in weight in the two cases, we may infer that Case 7 is also paralytic.

EXPERIMENT 11.—To determine how chloroform will act when injected by one of the large veins into the heart.

A puppy, weighing 4 lbs. 3¼ oz. ʒ ss., was taken, and a drachm of chloroform injected, without admitting any air, through the external jugular, into the heart. One minute elapsed before respiration ceased, and the heart acted feebly half a minute longer. At two minutes respiration began again, and the heart also to act. Four inspirations took place and no more, when the heart became quiescent one-fourth of a minute after the lungs ceased to act.

Post-mortem.—Immediately after death: The heart and large blood-vessels were distended, all the cavities of the former containing coagulated blood. The endocardium was of a different color from that usually observed, viz., a bright pink red. Both lungs were highly congested, affording both mucus and blood on section. Both lungs were expanded until the chest was opened, when both collapsed, but not so much as is usual.

Weight of body	23,430 grs.
" " heart	780 "
" " right lung	540 "
" " left lung	390 "
" " body to heart and lungs	14 to 1
" " " heart	30 to 1
" " " left lung	60 to 1
" " " right lung	46 to 1
" " heart to lungs	10 to 13
" " " left lung	2 to 1
" " " right lung	26 to 17
" " right to left lung	17 to 13

If we compare the relative weight of the body to the heart and lungs in this case with that of Case 8, in which latter there was considerable congestion of the lungs, we find a marked dissimilarity. Thus in Case 11, the relation is as 14 to 1, and in Case 8 it is as 16 to 1; the lungs and heart of the former weighing, relative to the weight of the body, 273 grs. the most—the congestion being, positively and relatively, the greatest in Case 11. As compared to Case 10, in which there was but little relative congestion of the respiratory organs, the difference in proportion to the weight of the body is 995 grs. more weight in the heart and lungs of Case 11; while in Case 7, where there was no congestion of the lungs, the difference is a little less, being 977 grs. greater weight in these organs in Case 11—a dissimilarity* which does not seem to indicate a uniform mode of death. Now Case 10 was one of palsy of the medulla, and Case 11 of congestion of the lungs. Again, we have shown that Case 7 is paralytic in character; and the great proportional difference in the weight of the lungs and heart in this, as compared to those of Case 11, would show the latter congestive in character.

If we compare the difference in the weights of the heart and lungs in Cases 11, 10, 8, 7 and 5, the comparison is still marked, though not so reliable. Thus, in Case 11 it is 120; in 10, 150; in 8, 60; in 7, 240; in 5, 1200 grs. It will be easily seen from this calculation, that as congestion increases in the chest from the effect of chloroform, the lungs and heart approach in weight; consequently the less the function of respiration is disturbed, the less is the action of the heart interfered with by chloroforming, and therefore the more desirable is the action of the anæsthetic. This also establishes the relation of reciprocity, already stated between the heart and lungs, and leads to the conclusion that they are a circulatory unit.

It is most probable that this is a case of death from obstruction of the heart by heart-clots, and consequent congestion of the lungs. Local palsy of the heart probably had not much influence, as this organ continued its action after the lungs had ceased. That the shock of the

* For Case 11, on the one hand, and 7 and 10 on the other.

chloroform entering the heart produced the insensibility would seem to be true, and also that this continued from the lack of blood sent to the brain; the heart acting inefficiently on the left side, but powerfully enough on the right to cast the blood into the lungs. The brain could not have been impressed locally, as respiration began after the lungs and heart were quiescent, no doubt from the stimulus of the external air upon the nervous radicles of the lungs. But the movements of these organs did not continue because the heart was obstructed. Local palsy of the lungs could not be the defect, for there was but one drachm of chloroform thrown into the heart, and the lungs could not have been much impressed, even by the positive presence of a portion of this quantity in them, as is shown by respiration commencing unaided.

Experiment 12.—The object of this experiment is to learn the effects of chloroform when given by the stomach, and to contrast these with the results in the other cases here cited.

A strong, thin dog, weighing 16 lbs. 9 oz. 7½ ʒ, was the subject. At thirteen minutes after 10 A.M., we injected through a stomach tube ʒ j. of chloroform into the stomach. In a few moments, muscular twitchings were observed. The effects of this dose beginning to pass off, at twelve minutes of the experiment, ʒ j. more of the agent was injected. This produced sleepiness and renewed muscular twitchings. The animal growing wakeful again, at twenty-four minutes we gave, as before, two drachms more. This produced excitement and some somnolency. The effect of this passing off, at fifty-two minutes two drachms more of chloroform were given. This soon ceased to have any effect, when, at sixty-one minutes, two drachms more were given. This dose produced rapid respiration and violent muscular contraction. The former grew more and more rapid and shallow, and the function nearly ceased. Then gradually the inspiration became deeper and deeper, until finally the dog opened his eyes. Thinking the case needed more of the anæsthetic, at seventy-one minutes ʒ ss. was given. This not seeming to have any effect, at seventy-three minutes, fearing the animal would awake and become unmanageable, ʒ ss. more was given. Soon respiration became rapid as before, and ceased at eighty-two minutes. At eighty-seven minutes, a few inspirations were observed, when res-

piration finally ceased. The heart became quiescent at ninety-two minutes. Insensibility was present from the time the last dose was given, and occasionally before. Thus it required one hour and thirty-two minutes in which to destroy this animal, and two ounces of chloroform.

Post-mortem.—Two hours after death: The brain was congested most in the cortical portion. The sinuses were full of dark blood, but there was no effusion. The stomach was empty, excepting that it was distended with gas. The stomach and bowels were traversed with fine red vessels, but the general appearance of the lining membrane was pale. The color of the liver was dark red. The lungs were uncollapsed until the chest was opened. The right was dark, the left light red. The right, on incision, gave very little blood and mucus; the left, blood and mucus freely, and crepitated more than the right. The heart and large blood-vessels were greatly distended with dark fluid blood.

Weight of body	96,930 grs.
" " heart	1,800 "
" " right lung	1,230 "
" " left lung	840 "
" " heart and lungs	3,945 "
" " body to heart and lungs	24 to 1
" " " heart	59 to 1
" " " right lung	78 to 1
" " " left lung	14 to 1
" " heart to lungs	10 to 17
" " " left lung	15 to 7
" " " right lung	3 to 2
" " right to left lung	10 to 7

If we take the ratio of the weight of the body to the heart and lungs, in the several preceding cases, we find the following expression, thus: In Case 12 it is as 24 to 1; Case 11, as 14 to 1; Case 10, as 34 to 1; Case 9, as 30 to 1; Case 8, as 16 to 1; Case 7, as 59 to 1.

Then the difference between Case 12 and the others mentioned in the last table, is as 24 to 14, to 34, to 30, to 16, to 59; a large diversity, which certainly indicates that death could not have occurred in the same manner in each case. If Case 7 is the usual manner in which death occurs from chloroform, then all the others mentioned can not be

like it. Then if Case 7 be taken as the standard, the difference is as follows: In Case 12, 35-59th more heavy; Case 11, 45-59th; Case 10, 25-59th; Case 9, 29-59th; Case 8, 43-59th.

The ratio, then, stands 35, 45, 25, 29 and 43. It will thus be seen by these calculations that Cases 11 and 8 show most congestion of the heart and lungs, and Case 12 next in this respect. Now in Case 8, the anæsthetic was given by the lungs; in 11 it was thrown into the heart, and in 12 into the stomach; and if you remember, all showed much congestion of the heart and lungs. But Cases 9 and 10 do not present so much congestion of the heart and lungs as those last mentioned, and resemble more Case 7, in which the agent was inhaled. Case 9 was destroyed by pithing, and 10 by throwing the chloroform upon the medulla, the same organ being acted upon to induce death, and the result being similar; viz., but very little congestion of the lungs. The amount of blood in the heart in the last two mentioned cases was much less than in this organ in Experiments 11, 8 and 12.

From these considerations, we may draw the conclusion that more or less congestion of the lungs was induced in these six cases, and that, as the agent was introduced into the lungs or heart direct, the amount of congestion increased as the time required to destroy the animal decreased. Thus in Case 7, the animal was chloroformed by lungs, and over sixteen minutes elapsed before death occurred, and no congestion of lungs was observed; while in Case 8, an animal of the same weight and chloroformed in the same manner, died in four minutes, presenting marked congestion of the lungs.

In Case 12 the blood must have contained much chloroform, but a long time was required ere it could pass into the circulation, and locally impress the medulla.

Again, to refer to Cases 8 and 7, it will be remembered that the difference in the relative weight of the body to the heart and lungs in the two cases is 43-59th greater heft of the latter organ in Case 8. This is a marked diversity, and must lead to the conclusion that chloroform applied by inhalation may affect the lungs in two ways, viz., by congestion and by paralysis. This may be further shown by simple inspection of the lungs in Cases 1, 2, 3 and 4. In the 1st, they were congested in some parts; and in the 2d, 3d and 4th, there was no congestion. In

every one of these cases, however, the lungs were more or less collapsed, the blood being concentrated into less space, thus showing a want of energy in the heart. Each case, too, developed an expanded lung until the chest was opened.

Case 9 illustrates both of these facts. The collapse of lungs after the chest is opened is not peculiar to these cases, but probably will take place to a greater or less extent after any form of death. But how can the same agent at one time produce congestion and, again, paralysis? This we can not answer satisfactorily. It may be that it is produced from the chloroforming being performed more gradually in the case of paralysis, it acting as an irritant when profusely given, cutting off the external air, and congestion resulting, as it would, from exclusion of air from the lungs by any other cause. Physical peculiarities may aid this to a great extent, but of this we know but little in the inferior animals. But although we can offer no other explanation which will harmonize these two dissimilar conditions, yet the facts are before us to prove the reality, and by these should we be governed.

In what manner is the brain influenced by this anæsthetic?

It will be noticed that in all these experiments insensibility generally resulted within two, and often in less time than half a minute; in fact, as soon as the agent could traverse the circulation, and locally chloroform the sensorium. That chloroform may produce an overwhelming and prostrating influence through the medium of the nervous system, we have no doubt, but that this is transient and quite dfferent from the peculiar sedative action which it produces on the sensory ganglia, we can have no doubt. The agent must enter the blood to produce its proper effect. This is shown in Case 12, where several times the animal was unconscious for a few seconds. The true effect, however, of the agent did not ensue for a long time, because the anæsthetic passed so slowly through the stomach into the circulation, and thus so tardily reached the sensory ganglia. That the chloroform enters the circulation is proven by its emanating from all parts of the body, and by the dark fluid state of the blood observed after its exhibition. It would seem, too, that such a subtile agent would be likely to enter at the lungs.

I do not propose to waste your time by considering the experiments

of others which positively determine, by chemical analysis, the presence of this anæsthetic in the blood.

Thus far, these experiments have been instituted to determine in what manner chloroform produces death. The subsequent cases are designed to discover to what extent chloroforming may be carried and the animal be restored, and also to ascertain if there is any resuscitating agent.

EXPERIMENT 13.—A dog, three years old, was chloroformed by the lungs until the heart ceased to beat. Artificial respiration was then performed by pressing up the diaphragm through the medium of the abdominal walls, and alternating this with compression of the sides of the chest. This was continued about three-quarters of an hour, but the heart did not react, and the animal was not restored.

EXPERIMENT 14.—To determine the same point by the aid of artificial respiration and galvanism.

A strong dog, one year old, was chloroformed as usual, until the heart ceased to beat. One pole of the battery was placed over the medulla oblongata, and the other over the apex of the heart, and opposite the diaphragm. Artificial respiration was carried on at the same time. Although muscular contractions resulted, the heart did not react, and the animal was not restored.

EXPERIMENT 15.—To determine the above point by inflation of the lungs with air from a pair of bellows, the trachea being divided and the nozzle of the instrument introduced and securely tied. Expiration was promoted by pressing down the valve of the bellows.

A pig, five months old, was chloroformed as usual until the heart ceased to beat, and the apparatus arranged before the heart's action ended. The lungs were then inflated sixteen times a minute for over an hour. But no sign of life was noticed.

EXPERIMENT 16.—To determine the same by inflating the lungs with oxygen gas. The gas having been collected, a dog, three years old, was taken and chloroformed as usual. The trachea was then divided before the heart had ceased to beat, and the open extremity of a small tin tube, which had a lateral branch near its middle, inserted

and securely tied, the other end of the tube being attached by elastic tubing to a gasometer, which would contain fifteen gallons. At this stage of the experiment, the lungs which had ceased began again to act, and respiration to be fully performed. The chloroform on a sponge, surrounded by a bladder, was then held over the open end of the side tube, and a little air allowed to pass with the anæsthetic. Respiration, however, could not thus be made to cease. Five drops of chloroform were then placed in the lateral tube, and the air permitted to pass into the lungs, after which respiration ceased in half a minute, and the heart's action half a minute later. When the heart was quiescent, the open mouth of the side tube was closed with the thumb, and the gas let on. The lungs having expanded, the oxygen was shut off, and the thumb removed, when the gas was expelled. This process was repeated sixteen times per minute for twenty minutes, until all the gas was consumed, after which artificial respiration was carried on for forty minutes longer by forced breathing through the tube by assistants. But life was not restored.

Post-mortem.—Immediately after death: The lungs were scarlet red, collapsed and uncongested. The right ventricle of the heart was largely distended with black, soft, clotted blood, while the left was not distended, but contained firm clots, and fluid very bright red blood. No other part of the body was examined.

It is evident from this case that the oxygen first entered at the lungs, and subsequently the left side of the heart. This is shown by the bright red arterial blood in the left heart, and the pink red color of the lungs. We, however, have no evidence in this case that the oxygen passed on to the brain, and it is probable from the amount of clots in the left heart that it did not. This calls to mind the fact that any restorative agent, applied to any of the surfaces, must act by stimulating the medulla *through the nervous system.* But when the chloroforming has proceeded so far as to cause a cessation of heart action such afferent stimulation will be of no avail, when applied to the lung surface, for this is benumbed by the local action of the chloroform. So to be effectual, the exitant must enter the circulation, and impress locally the medulla.

Again, if the agent could pass through the systemic circulation, the

chloroform would flow with it and neutralize any vivifying influence which the excitant might have upon the medulla. Thus it will be seen that restoration is almost impossible after the anæsthetic has so far impressed the medulla as to cause the heart to cease its motion.

It is plain from this and several other of these cases, that restoration may take place, by artificial respiration, by the aid of abdominal pressure, the bellows, or oxygen, and even the mere removal of the anæsthetic, before the heart has ceased its motion and after respiration has ceased; but not after the heart has become quiescent.

I may here refer to the opinion of Prof. Dalton, of New York city, who is certainly one of the greatest of physiological experimenters. He maintains that resuscitation from chloroforming can not take place after the heart has ceased to beat.

In these several cases the pulmonic circulation seems to be primarily affected. This can not take place through this circulation, as it is impossible for the chloroform to pass backwards to the right side of the heart, but it may proceed to the left side. Consequently it must produce its sedative agency first upon the left heart. If, however, the action of the heart continues long enough, which it generally does, the chloroform may locally reach the medulla through the circulation. (It occurs to me on looking over this article, that the chloroform may impress the heart by entering the coronary arteries, and locally benumb the motor nerves of the organ.) The lungs, too, may become congested from the presence of carbon and absence of oxygen. The heart is arrested in its motion on the left side by the local paralyzing effect of the agent, as well as that upon the medulla; and on the right side by paralysis, and distension of the cavaties, the two causes preventing contraction.

It is the opinion of Prof. Dalton, that death by chloroform takes place from palsy of the heart, and he bases his conclusion upon the fact that the heart continues to act for some time after respiration has ceased, and the chest has been opened and lungs exposed, so as effectually to arrest breathing. In this opinion we can not agree with this able authority. It has always appeared to us that as the lungs have invariably failed first, that therefore these should be the weaker organs, and the morbid process begin here; and, moreover, we have seen that

when the action of these have been restored, that consciousness was soon reinduced. We know, too, that the heart is mainly supplied from the sympathetic nervous system; this and the comparatively few fibriles from the vagus can not be impressed until the chloroform has reached the lining membrane of the cavities of either side of this organ. Therefore the lungs would seem to be most at fault, and the process to begin in them, and affect the left heart secondarily, and the right heart lastly.

It will be remembered that when the distension was removed by division of the pulmonary vein in Case 3, that the walls of the right auricle began to contract, and likewise the walls of the right ventricle in Case 4. But we do not remember to have seen the left side of this organ contract after division of the pulmonary artery. This would show the left side of the heart most affected, and the right least, by the actual presence of chloroform in the heart cavities, and that irritability was not wanting in the right side of this organ; and also that distension of the right side of the heart was the great defect of this half of the organ, and not annihilation of irritability, although the latter must have been impaired.

Before drawing any conclusion, permit me to call your attention to the experiments of MM. Perran and Duroy, on chloroforming, which you will find narrated on page 99, *London Lancet*, in the January number, 1861. These gentlemen hold that chloroform, alcohol and ether act primarily on the nervous system, while carbonic gases act first on the blood, changing its character, and then upon the nervous centres. If these gentlemen mean by chloroform acting primarily on the nervous system, that it first locally benumbs the afferent nervous radicles of the lungs, and that the chloroform does not make its impression upon the brain through the afferent nerves, then we can concur in their opinion. But if we are to understand them as teaching that the medicinal action of chloroform is positively transmitted through the nerves to the brain, without the necessity of the agent passing the rounds of the circulation to impress the brain locally, then we can not coincide with their belief. For we know that this agent does enter the blood, rendering it more fluid and dark, and, moreover, it can be distinguished emanating from all parts of the cadaver immediately after death.

After having been honored with your attention so long, and wearied your patience, I would willingly cease here and draw no conclusions; but such a course would leave the article in an imperfect condition. I must, therefore, solicit your indulgence to state the conclusions.

Conclusion 1st: That from the effect of chloroform by inhalation, the lungs will cease to act first and the heart last.

Conclusion 2d: That rapid chloroforming does not always produce congestion of the lungs.

Conclusion 3d: That when congestion of the lungs does result, it is sometimes greater in one than in the other, and often present in one and absent in the other.

Conclusion 4th: That collapsing of the lungs in these cases occurred in every instance inversely as congestion was more or less marked.

Conclusion 5th: That we can offer no satisfactory explanation why chloroform should sometimes produce congestion of the lungs and heart, and again paralysis of these organs; save that it may result from being too profusely or rapidly given. Consequently, to obtain the safest effect of the agent, it should be slowly exhibited, and a large proportional supply of fresh air admitted, that respiration may be unarrested and insensibility gradually induced, by the agent passing through the circulation and reaching the sensorium.

Conclusion 6th: That the chloroform enters the circulation and pursues the natural course of that system, and therefore it can not travel from the lungs to the right auricle, but must course from the right heart to the lungs after it has passed through the systemic circulation.

Conclusion 7th: If the anæsthetic is applied to the lungs, there is either no congestion of these organs, and much dilatation of the heart, or congested lungs and heart.

Conclusion 8th: It is immaterial whether the paralyzing agent be applied locally to the medulla, or to the lungs. In the latter case, a longer time will be required to kill, provided the case is purely of the paralyzing character, and less if congestion of the lungs result.

Conclusion 9th: That the more potent the paralyzing agent is upon the medulla, the sooner does death ensue, and the less is the heart dilated and lungs congested.

Conclusion 10th: That chloroform may produce a general excitement by being applied to the nervous radicles of the nose, throat and lungs, and also induce local anæsthesia wherever applied. Yet to produce insensibility it must reach the sensorium by circulation, and to cause death by paralysis it must locally impress the medulla oblongata. It matters not how much benumbed the afferent nervous radicles of the endocardium by the local action of the anæsthetic, the medulla will continue to be excited by the blood circulating in it, and thus motor agency be sent down to the heart, until the medulla, too, is paralyzed.

Conclusion 11th: That the chloroform, through the circulation, first impresses the cerebrum, producing unconsciousness; then the sensory ganglia, inducing insensibility; next it acts upon the medulla oblongata and spinal cord; and lastly, it affects the sympathetic nervous system.

Conclusion 12th: That the openings in the heart are not generally obstructed by clots, from the effect of chloroform, and hence death can not take place from obstruction in this organ. On the contrary, we generally find the blood more fluid than natural, and often excessive in quantity in it. The latter, we have no doubt, may induce death under certain conditions.

Conclusion 13th: The fact that the lungs cease to act first and the heart last, sometimes one being relatively more congested, and again the other, would indicate these organs affected through the same channel, and not the heart solely at fault.

Conclusion 14th: That restoration may take place after the lungs have ceased to act, by the institution of artificial respiration in some form, but not after the heart has ceased to beat.

Conclusion 15th: The excitor nerves of the general surface, the fifth, and of the pneumogastric are, as is well known, the main afferent nerves of respiration; while the facial, the phrenic, the intercostal and the spinal accessory are the motor nerves. It is evident from this anatomical glance, that there is a large excitor lung surface, but, unfortunately, the nerves of this are paralyzed, consequently exciting agents can not act here to stimulate the medulla. To a certain extent, this is the case with the excitor nerves of the mucus membrane of the upper air passages. The general surface is unaffected locally, and through

the excitor nerves of this must we produce our greatest exciting impression. Thus stimulating frictions, cold and hot douche, the hot iron held near the surface, over the spine from one end to the other, may be resorted to. Galvanism may be tried, applied to the medulla and heart, and through the spine. As to the introduction of agents by the lungs into the circulation, so that they may locally excite the medulla, we fear this is almost impossible, for the heart is palsied, and therefore the column of blood will not be sent on to the brain, even if the restorative advance so far as the heart. It must not be forgotten that the excitor radicles of the left endocardium, too, as well as those of the lungs, are benumbed by the anæsthetic, and therefore, even if the excitant reach the heart, it can not stimulate it to contraction. It is also plain, too, admitting the excitant could reach the medulla through the circulation, along with it would flow a *chloroformed blood*, which would add to the local anæsthesia of the medulla, if it did not prevent all influence the restorative might otherwise have had.

Again, the heart is mostly supplied from the sympathetic, consequently, could the restorative pass to the medulla, but little effect would reach the heart through the few cardiac motor branches of the pneumogastric. From such considerations as these, it would seem that restoration is probably impossible after the heart has ceased to beat.

It may be that in our experiments we have not properly used the galvanism, and that an exciting fluid could be passed through one of the internal carotids direct to the medulla, and thus stimulate the latter to motiferous action; but this remains to be investigated.

Conclusion 16th: That congestion of the brain, in these cases, seems to be a rare result.

In presenting for your consideration these experiments and conclusions, our object has been to interest you with such practical data as bear upon the subject. We have endeavored to be as concise as possible, so much so that the data have not been considered in all their bearings. Yet the article is lengthy, and presents many practical details which by some would be considered uninteresting; but if the theme be closely considered, it will be found not only interesting, but highly instructive and important.

We should remark that the mathematical calculations of these experi-

ments are not fractionally correct, but they are sufficiently accurate for all practical purposes.

We regret that we can offer nothing new under the head of *restoration*. We feel, however, that we have clearly shown what are the obstacles to be overcome, and developed as plainly that restoration may take place before the heart has ceased to beat, and after respiration has ended. There are, no doubt, others who are able and willing to investigate this subject, and we only hope that we may aid such in their researches. It is often of as great value to know what we can not do, as to discover what we can.

ADDENDUM.

Since reading the foregoing Report to the State Society, I have seen a synopsis of the experiments of A. Ernest Sansom. The conclusions of this writer are at variance with my own. We have, therefore, investigated his experiments, and now desire to place the results before the Society, simultaneously with the original article, in the form of an addendum.

The conclusions of Mr. Sansom may be found in the *London Lancet* and the *American Medical Monthly;* from the latter we quote:

Conclusion 1st: Chloroform affects the red corpuscles, but not the white.

Conclusion 2d: It corrugates and dissolves the cell-walls, alters the shape of, and produces coherence of the red corpuscles.

Conclusion 3d: It causes the contents of the red corpuscles to coalesce.

On examining the circulation of a frog's foot microscopically during chloroforming, he found—1st. Blood motion accelerated; 2d. Dilatation of capillaries and blood-vessels; 3d. Alteration in shape of blood-discs, and tendency to cohere; 4th. Blood stasis.

The first series of experiments by this gentleman were made by subjecting the drop of blood to the action of pure, undiluted chloroform, on the microscopic slide.

Without commenting at this time on these conclusions, we will proceed to give the following experiments:

EXPERIMENT 1st, July 24, 1861.—Took three clean glass slides and three thin covers, and successively placed a portion of a drop of my own blood on each.

No. 1 was exposed to the field of the microscope (a Grunow), under a power of nearly 700 diameters. An achromatic condenser was attached. The white and red corpuscles could be distinctly seen, and their size and form were carefully noted. A drop of chloroform was then allowed to run under the cover, and its effect noticed. The outlines of the red corpuscles became more distinct, and no change of form was seen. The slide was set aside, and when the blood was perfectly dry, again noticed, when the red globules were corrugated and somewhat smaller. No effect was observed upon the white corpuscles. A drop of blood was then placed upon slide No. 2, and the same experiment repeated, with the same results. A portion of a drop was placed on slide No. 3, and allowed to dry without subjecting it to the action of chloroform. The red corpuscles became more distinct, and corrugated, and aggregated together on drying equally as much as in Experiment 1. In fact, we could not distinguish any difference in slide No. 1 and 3, on repeatedly viewing each other alternately.

EXPERIMENT 4.—Placed ℥ss of chloroform in a half drachm vial, and added four or five drops of fresh blood from a healthy horse. This was corked and shaken for five minutes, and allowed to stand half an hour, and then a portion of a drop examined microscopically. The red corpuscles were corrugated, and generally the white corpuscles. A coagulum soon formed in the vial, which remained of a bright red, the same color that it was when drawn. Two hours later the clot was examined, when it was found loose, still retaining its bright red appearance. The chloroform poured off was colorless.

EXPERIMENT 5.—A drop of blood from a healthy horse was placed on a slide, covered and viewed. Where the red globules were separated from the mass they were not corrugated, but in the mass they were.

The white corpuscles were somewhat affected, but not enough to materially change their form. When the coagulum (which became dark as exposed to the air) was hardened, a thin portion was examined under the field of the microscope. The red corpuscles were found corrugated, but the white were unaffected. No fibrous arrangement could be detected.

Experiment 6.—Placed a drop of blood on a slide, and added a drop of the following solution:

℞. Chloroform, gtt. x.
Sacch. alba, ʒ j.
Aqua, ℥ ss. M.

On observing microscopically, no effect was noticed on the corpuscles. Ten drops more of chloroform were added to the solution, and subsequently, twenty more, and the experiment repeated—still no effect was had upon the corpuscles. When the blood was dry, no more change was observed in the globules than in Experiment 3, where no chloroform was used.

Experiment 7.—A strong, medium-sized dog was chloroformed by lungs, and in two minutes the animal ceased to breathe, and a few seconds afterwards respiration again began, but after several inspirations the lungs ceased to act, and a few seconds later the heart also. The brain was immediately exposed and removed, and with it some of the blood from the sinuses (which was dark and fluid). The whole was immediately placed into a small retort, the end of which was securely corked. The heart was not so much distended on either side as is usual. The lungs were collapsed and bright pink in color. The left ventricle was punctured and its blood received into another small retort, the end of which was secured as before. Both of these retorts were exposed to heat, and the vapor from both collected into separate receivers. But no chloroform could be detected in either fluid. Took a drop of the brain-blood and exposed it to the microscope, and found the red globules in good form and the edges distinct. Took a drop of the heart-blood,

and treated it in the same manner, and observed that the edges of the red globules were very finely serrated, but could distinguish no change in the form of these corpuscles. The last experiment would seem to indicate that the test for the presence of chloroform was not sufficiently accurate. That it had passed on to the heart would seem to be shown by the slight change in the edges of the red corpuscles. This may have been induced by fine air globules collecting around the corpuscles, or from pressure of the glass cover, which we know will sometimes cause this appearance. But Mr. Sansom probably would say the change in these was affected at the lungs, and then they passed on with the current of the circulation to the left heart. But if these globules thus reached this cavity, why not the chloroform also? The effect that chloroform may have upon the red globules is one thing, and its action upon the economy another; and it must not be supposed that, even if it annihilated the red globules, that it would not subsequently affect the nervous centres.

Again, in Experiment 4, where a few drops of blood were exposed to the full action of chloroform in a corked vial, the globules were corrugated, but not dissolved; and it was noticed, also, that the color of the blood was unchanged. This contrasts strongly with the dark red blood always found after chloroforming. This points to the fact that there is, unquestionably, a larger amount of carbon in the circulation during chloroforming than is natural; but that this arises from the function of the red globules being destroyed we can not believe, but would rather refer it to a want of oxygen, from the presence of chloroform in the air inhaled, which, diluting the atmosphere and furnishing the lungs with less oxygen, gives rise to an accumulation of carbon in the blood. That this carbon may contribute its share in anæsthesia we can not doubt, but that this is the cause of chloroform insensibility our numerous experiments do not dictate. The presence of this carbon not only causes the dark blood, but its presence is a mere negative effect, a collateral result of the chloroforming by lungs. The chloroform passes through the circulation, and the carbon with it in just such quantity as the interference with the function of aëration causes, aiding the chloroform in the anæsthesia of the nervous centres, but being subsidiary to the chloroform. This would seem to be shown by the fact that all ex

perimenters, including the late Dr. Snow himself, have found that the less respiration was interfered with—*i. e.*, the more oxygen allowed to enter with the chloroform (Dr. Snow thought the proportion should be air four and chloroform one part)—the safer and more happy would be the anæsthesia. It is well known that deaths from apnœa by chloroform generally take place rapidly, and that, therefore, in such cases we do not observe the true anæsthetic effect of this agent.

It is a fact to be observed in this connection, that Ragsky and Dr. Snow have detected chloroform in the blood in various parts of the system, and in our original experiments we could distinctly smell the agent emanating from all the cavities of the body.

Again, in one experiment previously instituted, the agent was given by stomach and produced anæsthesia, while the function of aëration was undisturbed; thus showing no relation to carbonization of the blood, and want of oxygenation from chloroforming.

Again, if the chloroform act by destroying the red corpuscles, the mass of these injured by the agent would be so great that the functions of life would be seriously interfered with, and days and even weeks would elapse before the circulating fluid would again become healthy. But such is not the fact, but on the contrary, as the effect of the agent upon the nervous system passes off, are the powers of life restored to their wonted action. The kidneys throw off the agent largely, and probably other surfaces, and the system is thus soon relieved of the sedative.

It will be noticed in these experiments by myself, that in proportion as the blood is exposed to the full action of chloroform, so are its effects upon it more marked. Thus, in Experiment 4, the blood globules of both varieties were affected, the red being corrugated and depressed, the white only slightly affected; while in Experiment 6, where the chloroform was variously diluted, no action resulted upon the corpuscles. That chloroform should destroy the red globules when applied to them undiluted, is no wonder when we know that it will blister when in contact with the skin, and that it dissolves so many substances. But we claim that the agent entering the lungs is first diluted by the vapor in the expired air, and then by the serum of the blood, so that to judge properly of its effect upon the red globules, the chloroform must be di-

luted, as was done in Experiment 6. Thus no effect was had on the red corpuscles.

But to refer to the conclusions of M. Sansom *seriatim:* we notice (see *Lancet*) that he adopts the opinions of Faure and Gosselin, that chloroform may be applied to the brain directly, and through the medium of the circulation, without producing unconsciousness. This our experiments will not support. Thus in the original article, a case was narrated, wherein it was shown that the agent was injected upon the medulla, and shortly insensibility and death resulted, and afterward none of the agent was found around the medulla, so that death could not have arisen from compression.

Again, the analogy between this and other experiments was drawn, in the latter of which the medulla was pithed, and also the agent given by inhalation, and similarity established in the mode of death in the several cases.

Again, in some of these cases, there was obvious congestion of the lungs. Now if the hypothesis of M. Sansom be correct, we should find death resulting most generally from congestion of the pulmonary organs, which is not the case, but is the exception. In fact, the morbid appearances should resemble those found after the inhalation of carbonic acid gas, which they do not.

Again, we can not agree with M. Sansom, that the blood should be exposed to undiluted chloroform to obtain the true effect of the agent on the globules, but believe that the agent should be applied artificially to the blood, in about the same degree of concentration as is exhibited after it enters the blood at the lungs.

Again, our own experiments show with undiluted chloroform that the red globules may be corrugated, altered in shape, but not per force of the chloroform made to cohere, but because the globules naturally cohere when out of the blood-vessels, and because they take up less space when corrugated, they come more closely together. We have often seen the columnar arrangement of the red corpuscles of the body, when the blood was not in an inflammatory state. But if the chloroform be applied diluted, no effect will be noticed from it on the corpuscles.

Again, we never have seen the cell-walls dissolved, though faithfully trying and repeating the experiment with pure chloroform. As a con-

sequence, we have not detected any coalescence of cell contents. Indeed, if we regard the red globules as a homogeneous structure, the cortical portion of which is condensed, thus answering for the cell-wall—the corpuscle having no distinct cell-wall—and consider the entire corpuscle as made of the pretenaceous compound *globuline*, enclosing in its structure the cohering matter of the blood,—I say, if we thus view this little structure, we can scarcely see how, when it is corrugated, it could throw out any contents, since it has no contents, save the coloring matter of the blood. That this is not dissolved out, but is retained within the contracted globule, we have convinced ourselves by repeated experiments. Whenever the mass of globules are in the field of the microscope, there will be found the coloring matter.

Again, to illustrate, in one of our experiments, after the blood of the horse had been shaken up in chloroform and allowed to stand several hours, the chloroform was poured off colorless. Still further, when several drops of blood were subjected to chloroform, and allowed to stand twenty-four hours, and not having been shaken, neither the chloroform nor the sides of the vial were colored. Thus, if the *hamatine* is not thrown out from the corpuscle, it is probable that the homogeneous *globuline* is not, and that when these structures are corrugated the entire globule is shrunken, but not dissolved or contents thrown out.

But we pass on to notice the last division of M. Sansom's conclusions, based upon his experiments upon the frog. To do this correctly, it was necessary to repeat his experiment, which we have faithfully done, as will be seen by

Experiment 8.—The web of a young frog's foot was exposed under the field of a microscope, and observed with a power of 600. The blood globules could be distinctly seen, as well as their outlines. The circulation was crowded in some parts, owing, no doubt, to the irritation of tying the extremities of the toes to secure the foot; while in other parts of the field the circulation was free, and not in the least crowded. The blood passed rapidly along through the main vessels, while in the smaller it coursed more slowly, and in some there appeared to be nearly a stasis. When the globules were so crowded, the red corpuscles appeared to be deformed. Chloroform was then given. At

first the circulation became more rapid, clearing out the engorged vessels and contracting them. They then resumed their natural calibre, and as the action of the heart became slower, the impetus of the blood became less, and at last slight dilatation of the vessels occurred, they filling up with globules, first in the larger vessels, then in the smaller, until when stasis supervened, on the cessation of the heart's action, they were all full, but could hardly be considered engorged. The chloroform was then removed, and shortly the circulation was resumed in the web, but only for a few seconds. Chloroform was given gradually in this case from a little funnel of paper. It required four minutes to kill the animal. No change could be detected in the form of the corpuscles. But to be more certain of this, a drop of blood was taken from the animal's heart (which began to pulsate when divided, and continued to do so for half a minute), and placed upon a clean slide with a cover and observed. Here and there might be seen a few deformed globules, but not corrugation; but the mass of these structures were perfect in form and unaffected. A drop of blood was then taken from the thigh of another healthy frog, which had not received any chloroform, and placed upon a second slide and covered. This was repeatedly compared with the first slide by myself and others, and not the slightest difference could there be detected between the red globules of the two frogs. The outlines of one were just as distinct as the other, and the form perfect in both.

Then to refer to the conclusions of M. Sansom, we agree with him that the circulation was at first accelerated, as it always is under the presence of chloroform, and that when this passed gradually off, dilatation of vessels and aggregation of globules was a sequence of want of vascular power, which resulted in stasis when the heart ceased to act. The same aggregation of globules took place before the chloroform had been given, from the irritation necessary to secure the frog's foot, which, under the additional stimulus of the first, or the exciting action of chloroform, was removed, and soon followed by the relaxation of the secondary or sedative effects of this agent, and the consequent reaggregation of the blood corpuscles. The stasis present seem to have caused the aggregation of the globules—not any peculiar action of the anæsthetic on the blood globules; and we can not coincide with M. Sansom in his

statement that the red corpuscles are altered in shape, as our experiments directly contradict the conclusion.

Then to conclude, we believe —

1st. That chloroform can not be applied either directly to the brain, or through the medium of the circulation, to an amount proportionate to the powers and idiosyncrasies of the individual, without producing *unconsciousness*.

2d. That chloroform to induce insensibility must enter the circulation and locally impress the sensorium.

3d. That anæsthesia may be aided by the presence of carbonaceous compounds in the blood, but that this is subsidiary to the presence of the chloroform in the blood acting upon the nervous centres.

4th. That chloroform diluted as it is by the serum when it enters the blood at the lungs, and onward in its course, can not produce any change in the functional action of the red globules.

5th. That the red globules may be corrugated and deformed by the action of undiluted chloroform out of the vessels, but not when diluted.

6th. That aggregation of the red corpuscles is not a peculiar effect of chloroform on these, but arises from approaching stasis within, and from a well known aggregative tendency when without the vessels.

7th. That chloroform first induces excitement and contraction of the vascular system, and then sedation and dilatation, and ultimately stasis.

The Analogy of Miasmatic and Electric Changes

IN THE

PRODUCTION OF DISEASE.

By N. DALTON, M.D., of Logan.

THE ANALOGY OF MIASMATIC AND ELECTRIC
CHANGES IN THE PRODUCTION OF DISEASE.

BY N. DALTON, M.D., OF LOGAN.

It has long been known to the observer, whether of the medical profession or laity, that certain localities—wet lands, marshes, etc.—produced a condition of the atmosphere that has been known by the unmeaning names of Malaria, and Marsh Miasmata.

It has also been known that the depraved condition of the atmosphere has been the cause of not only our Intermittents and Remittents, but of a host of other diseases, some of which will be hereafter specified. This knowledge has not been confined to the learned and observant of the medical profession, but the vulgar of all nations are in possession of it —the lower orders of France, Italy, Holland, and the United States, yes, even the negro of Africa seems to understand, and believes his ague due to the swamps, and decay of the rank vegetable matter in his neighborhood. But with all this knowledge, neither they nor their physician are as well aware as they ought to be, how this poisoned air does produce these diseases, as well as many other ills that they are heir to. To this unseen agent we may attribute Dysentery, Cholera, etc., in addition to the intermittents and remittents already specified; and these all united form only a tithe of the enormous amount of disease, suffering, and death dependent upon this subtle and invisible agent. We trust that we shall be able to demonstrate beyond a possibility, that this great agent is the cause of a larger amount of disease and death than all others combined; that a large proportion of the great list of chronic disorders which are the cause of such great suffering and inconvenience, many of them terminating in lingering and protracted death. Still further, the great majority of that unpleasant class of affections, known by

the medical man as *nervous*, is the offspring of this general parent of disease. There is, also, in those localities a vast amount of suffering that we can not classify, and in consequence of that inability we jumble them together and speak of them as ill health, feeling ourselves, at the same time, unable to define what we mean. To what extent this agent is the cause of death, will be apparent upon a moment's consideration, especially when we recollect, that in all the warmer and thence more populous countries, nearly the entire mortality is the product of malarious diseases.

In view of this, we think our estimate not too great when we say, three-fifths of the entire mortality of the human race is due to this one agent alone. If in some parts of our favored land it seems to be less destructive than others, it is yet far more so than has been generally imagined. From all who die of fever we may safely affirm that nine out of ten are the victims of that class of disease, some of which are often confounded with inflammatory fevers, and those known as Typhoid and Typhus. When we thus know the extent of human suffering and death, dependent upon this one great agent, we have surely abundant reason to take a deep interest in the cause of such disease and death, and especially when, by a knowledge of its exact nature, we may possibly be guided to a plan by which its power may be averted, or its influence diminished, and thus reduce this heavy amount of human suffering with all of its complicated consequences.

We need not go from home in order to convince ourselves that this subject is one of vast interest; and that interest sufficiently great to apologize for discussing a matter upon which so much has been written. However, this much writing is alone sufficient evidence that it is a subject of vast importance to the medical man, and its effects show it to be a subject of still greater importance to the citizen even here. Yet in all articles upon this subject we are so constantly pointed to the Pontine marshes of Rome, the canals and dykes of Holland, the pestiferous swamps of Greece, France and Spain, that we are about led to believe these are the only infected spots in the wide world; but do they present any more evidences than our own "Sunny South?" In nearly all this fair land the inhabitants are a prey to this invisible enemy. The fragrant breezes are poisoned; the dews of its summer evenings are

death; the banks of its refreshing streams, its rich, flowery meadows, the borders of its beautiful lakes, the luxuriant plains, the fields with their overflowing agriculture, the valleys where its aromatic plants regale the eye and perfume the air; these are the chosen seats of this plague. It would seem that death walked hand in hand with the most bountiful sources of life. It would seem to deal with an unsparing hand;—the laborer reaps his harvest but to die, or he wanders amid the luxuriance of vegetation and wealth the ghost of a man, a sufferer from his cradle to his grave; aged even in his childhood, and laying down in misery that life which was but one of disease. He is even driven from some of the richest portions of this fertile, yet unhappy country, and they are left deserts; but they are deserts of vegetable wealth that man dares not approach, or if he does, he dies. This, connected with the value of life, and the consideration that the average chance of that life approaching to the proverbial limit of "threescore years and ten" is the measure of salubrity of a country, and that salubrity mainly depending upon the presence or absence—the range or limitation of malaria. In looking over the matter in this light ought we not, with propriety, ask ourselves if this subject is not an important one—one indeed of very deep interest, and worthy a lifetime of thought?

The average of human life in our State may be set down in round numbers at about thirty-five years. Will this average hold good throughout the entire land? Does the world present the same record? Are not many places much more salubrious, while others are so much more insalubrious, as to almost forbid any comparison? In many districts in our own country the average would not be over twenty-five years. Thus at one sweep we see nearly the half of human life cut off, and the executioner is malaria.

In our towns, our houses, are we free? Nay, it enters into our chambers, and stalks with us through the streets: it is behind us, around us, on all sides of us: every day sees its devastations extended. To fall by thousands in the tropical regions is no strange thing; there we find the harvest of death walking hand in hand with that of vegetable growth and decay. By this insidious agent have our armies been decimated. We cannot forget, if we would, that more soldiers are victims of diseases incident to camp life, than are slain in the most sanguin-

ary campaigns. While the sword has been slaying its thousands, malaria has slain its tens of thousands. It is disease, not the field of action, that digs the graves of armies. It is malaria by which the fiery spirit is so frequently quenched, and that upon the bed of disease. To this pestilence that walketh in darkness—to this destruction that wasteth at noonday — to this agent that has slain its thousands, am I desirous of calling your attention. In order to do so, allow me to wander from the beaten path—a path that we all know has led to no good results.

We all know, and with shame do I acknowledge it, that our notions of the etiology of disease are as crude, and often more unfounded, than in any other department of medicine. Many of them were found in the infancy of science, and are even now transmitted, unquestioned, from year to year. Being too lazy to investigate, we still blindly adopt, and implicitly follow them, though we often—yes, almost daily—have been led to see their inconsistency with facts that stared us so strongly in the face that we were led to doubt; but with all these observations of the intelligent and reflecting part of the profession, we have blindly adopted those crude notions rather than wander from the beaten path, though we knew that path led us astray. This blind adherence to long-established hypothesis is scarcely creditable to us, as members of a learned profession, and plainly tells that we have not been guided in our reasoning by sound principles of philosophy.

Simplicity being an attribute of the Almighty, in all the operations of his hand we are amazed at the number and diversity of the effects produced by the combination of a few simple elements, and from those effects have every reason to believe that, as our knowledge increases, this characteristic will still become more and more apparent.

The animal economy, being intricate and complex in its organism, composed of many tissues, all of which are subject to the control of a central power, the brain, from any change in which we may reasonably infer as many deviations from a normal condition, then how much more philosophical would it be to at once recognize a single principle capable of producing such change, than to vaguely multiply causes to the number of diseases in our nosology?

We talk of miasma, malaria, etc., as glibly as if we knew all about

it, so arranging it as to account for each class of disease. Not even being then satisfied, to still further account for disease, we veil our ignorance under the comprehensive name of "taking cold;" an expression to which we attach no meaning, or if any, the commonest observation shows it to be wrong. An etiology so manifold, must to say the least, be very uncertain. Then, if we can in many more cases satisfactorily account for these abnormal manifestations, and that through the instrumentality of a single principle, the old and vague one must be abandoned. In order to arrive at this more particularly, it becomes necessary to instance the analogy between the nervous force and electricity—an analogy so strongly displayed by Galvani, and more recently confirmed by the experiments of Majendie and others. Indeed, their actual identity has been rendered almost positive in the carrying on, by the aid of electricity, the processes of digestion, respiration, circulation, etc., during the suspension of nervous communication. We all know the influence it has in exciting muscular contractions in the dead body, and also the agency it exercises in resuscitating persons whose animation has been suspended from drowning; also the agency of electricity in many of our nervous diseases—neuralgia for instance. With these plain marks to guide us, it almost seems impossible that we should not long since have looked to a disturbance of an equilibrium of atmospheric electricity as the great disturbing agent, and producer of that train of diseases just mentioned.

Indeed, it seems almost a matter of surprise that these facts had not have led to the opinion, that the deficiency of electricity in the air, and its consequent abstraction from the body, has been the great etiological agent that has slain its thousands. It is known to almost every gardner that the *Mimosa, Trifolium Repens*, with a number of other plants, close their leaves at night. To what is this due but to the better conducting power of the air at that time, abstracting the electricity of the plants mentioned? Likewise, we find that fever and other forms of disease, such as rheumatism, neuralgia, catarrh, etc., all seem to be aggravated by the approach of evening.

Owing, perhaps, to the fact that the system, being enfeebled, would be unable to bear electrical changes, that could have but little, if any, effect upon the same person in a state of health. The great discovery

of Prof. Faraday, that oxygen was magnetic, taken into consideration with the fact that oxygen composes one-fifth of the entire atmosphere, we see at once what a mighty engine is set in motion for good or evil; and we can readily see the very close connection between this agent and vegetable growth and decay, and also how important the part it plays. In vegetable growth, carbon is fixed and oxygen set free; in decay, oxygen is fixed and carbon set free. Thus nature keeps up an eternal cycle of growth and decay, one dependent upon the other. From a proper investigation of these things, and giving each its due weight, it would seem that we could account for that subtle and destructive agent known as Malaria, Marsh Miasma, etc. In order to do so the more readily, we will give the result of some experiments in regard to the electricity of the air. Those experiments have been of unusual interest to me, and have been continued from August, 1850, up to the first of January last, and exhibited as an average for each month as follows:

January	*584	July	42
February	461	August	39
March	292	September	*29
April	158	October	56
May	99	November	151
June	52	December	491

The above mode was adopted from an outline given by Prof. Faraday, at a lecture before the Royal Institute, published in 1850. The instruments used to arrive at these conclusions was the gold-leaf electroscope, and Coulomb's electrometer. The result from these instruments was rather unsatisfactory, though continued for over two years. In the mean time I saw a description of an electrometer used by Peletier, which consisted of a brass globe placed upon a thin metallic stem, to which was affixed a dial, or graduated plate, and a delicate galvanometer needle, which indicated in degrees very certainly the amount of electricity obtained. I had parts of one manufactured, which I completed, and used in connection with those spoken of. The experiments were conducted with great care, yet they may not have been exact, owing to the rudeness of my instruments (having to make the most of them myself). My experiments show considerable variation from those

of Quetelet in the monthly average, and also in the minimum month. He places his minimum in June, and mine is in September. True, the time indicating the least atmospheric electricity is from the 10th of August to the 20th of September; but, as a month, September produces the least.

This is mainly due, in all probability, to the influence of the Gulf Stream, which Lieut. Maury informs us fans out along the coast of the Eastern continent, and prevents England from being ice-bound the greater part of the year, as is the case with Labrador, both being in the same latitude. This being the case, we are at once led to the conclusion, and with these facts before us, are we not justified in the opinion, that a change would be made in the monthly average of electricity corresponding with the month that would carry the greatest amount of heated water from the tropics to those shores? This being when the days are longest and the sun's rays nearer vertical, June would therefore be the month with France and England, when we here would have to wait until the earth's surface was heated to accomplish the same purpose. This, connected with the enormous amount of vegetable decomposition that takes place during periods of great heat and moisture, would seem to show the analogy of miasm and a low state of atmospheric electricity. In 1855 this was manifested to an unusual extent during the whole summer. From June up to the middle of October the electrical average was very low, and the vegetable decomposition unusually great; so great that even the grass rotted near the ground when looking green at the top.

This year was proverbial for the prevalence of malarious diseases. This would seem perfectly reasonable when we take into consideration that vegetable decay is but a slow process of combustion, or oxydation; and any process that fixes oxygen, it being magnetic, also fixes magnetism.

That the lessening in the atmosphere of any agent playing so important a part as electricity, would produce consequences in proportion to its importance, none will deny; and that this diminution of so important an agent would have a tendency to effect diseases, not only at different hours of the day, but increase and decrease the endemic diseases, in different months of the year, just in proportion to the electrical condition

of the atmosphere. Such remarkable changes in the electricity of the atmosphere could not go on very readily without affecting the statical electricity of the human frame. In evidence of this, we find that according to Casper, who has made much and laborious research upon this subject, a large proportion of deaths from disease take place from 12 o'clock to 6 o'clock in the morning, when the quantity of electricity in the air is at its minimum, or just reaching it, and also at a time when the atmosphere is, from its density, rendered a conductor of much more force than if rare. Is this merely a coincidence, or is there some connection between life and electricity? This is according to the theory of Dr. Faraday, that there are two maxima—at or about 9 o'clock A. M., and the same time P. M.; the minima at about 2 P. M., and at from 12 to 3 A. M. These correspond almost exactly with the barometrical elevations. To still further corroborate these opinions, we would bring as an illustration the recent discovery of Ozone, by Shoenbein, togetherwith its nature and effects. It is known to be produced in the atmosphere by electrical discharges, and it is very easy to determine its presence and variation.

For this purpose, Mr. Shoenbein tested the air with paper impregnated with a solution of pure sulphate or muriate of magnesia; the Ozone rapidly decomposes the salt, and the paper soon assumes a brownish tint. This action is much more powerful in cold than warm weather. We find the electrical average to correspond exactly with ozonic action, most beautifully demonstrating their near relation. A better test is a paper moistened with pure iodide of potassium, one grain; starch, ten grains; distilled water, two hundred grains. Paper thus prepared and carefully dried, when submitted to an electrical current and then moistened, immediately assumes a bluish or purple tinge, evidently the iodide of farina—the result of the oxydation of the potassium, and setting free the iodine, to form the new compound named. This test is exceedingly delicate—so delicate that an electrical spark emitted from a cat's or horse's back will produce its effects upon the test paper.

Ozone is nearly destroyed by heat, and its production by electricity ceases when sparks are emitted by a red-hot metallic point. This fact was ingeniously illustrated by Dr. Faraday. He insulated a small galvanic battery, capable of raising the temperature of a platina ball to full

redness. Discharges from this ball produced neither the aura, smell, nor the decomposing effects upon the iodide of potassium and starch; but all of these effects were immediately manifested when the ball was allowed to cool, and the current then passed through it. Ozone manifests powerful oxydizing properties. This is readily shown by exposing metals to it that are difficult to convert into oxydes. Silver, for illustration, when applied to the poles of a battery, soon tarnishes.

Some years ago, I exposed finely polished pieces of silver in various places, selecting the most unpleasant swamps in our neighborhood (and we have many), but I could not detect any influence made upon the plates; though exposed for many days in hot and dry weather, they would retain their fine polish and brightness. In my riding over the country at all hours, I noticed two places that never were foggy—one of them nearly a mile in extent, the other covering nearly the entire farm of Dr. Whipple. I spoke to the Doctor about the singularity; he told me that he had never known fogs to appear on the upper part of his farm, and assigned his reasons. His farm is situated at the mouth of a small creek, upon the river valley, and he supposed the draft of air from this creek to the river swept away the fogs. The Doctor being a fine theorist, I laid before him my notions, which he warmly seconded, and helped me to carry into effect. I exposed my silver plates here and at the other place, and calling, only two days after exposure, I found them tarnished. About this time I noticed Dr. Faraday's lecture on Shoenbein's experiments, and the tests given. In those swamps and the more malarious regions of our valley, I placed my papers, prepared by saturating with iodide of potash and starch; also in those fogless regions. In the former, no evidences of decomposition were produced, but in the latter, those papers upon moisture were always blue. Upon investigating the geological formation of those places, iron ore, known as bog ore, was found in large quantities, and this ore was strongly magnetic; even the trees in those localities were scarred and marked by lightning. Delicately white clothes exposed in the swamps would, in a few days, become mildewed, but in the region of this magnetic influence, or ore, remain white and pure; also clothes stained with indigo, upon exposure, would slowly fade, just as they would if exposed to an electrical current; but placing clothes thus

stained in a swamp, or in a jar in which decomposing animal or vegetable matter of any kind was placed, no effect would be produced.

Upon testing the air in the jar with the horse-shoe magnet, one that sustained an armature of six ounces—as soon as the magnet was applied the armature would fall—I continued using those that were lighter, until I found *this* jar to sustain one of only a few grains over four and three-quarter ounces. Decaying animal matter producing a much more marked result than vegetable.

Testing any of those airs, they seemed of equal purity, chemically considered; yet our good sense surely tells us that this notion of atmospheric constancy is wholly wrong. Can there be no difference between the air of confined rooms, or cess-pools, and the mountain-top? If so, why do we advise people to change locality for health? We can, to some extent, account for this invariable result when testing different airs. In those offensive places we have much of the oxygen fixed, as, carbonic acid, or carbonic oxyde, which, upon analysis, would be yielded up, and we thus get the usual constituents of the atmosphere in their simple state; but that air combined, as it was, would be wholly unfit for use; nor would it, in many instances, sustain life for any great length of time.

This being the case, and oxygen being magnetic, heat lessening the amount of magnetism in the air, and decaying vegetable matter fixing large quantities of oxygen, and this decay taking place at the same time in the year with this diamagnetic condition, is it unreasonable to suppose that our malarious diseases may be the product of that diamagnetic condition of the air? Another fact that strongly corroborates this is, that oxygen being a supporter of combustion, is necessarily all consumed in flame, and that heat nearly destroys ozone, or that its production ceases when electrical currents are passed through heated bodies. Now, upon the application of a good horse-shoe magnet to the flame of a candle, it is quickly and strongly repelled. So were soap-bubbles filled with hydrogen, carbon, etc., but those filled with oxygen were strongly attracted by the magnet. This would seem to imply a close analogy between the absence of oxygen and electricity, or, in other words, where one was fully developed, so was also the other. Another reason that strongly corroborates this view is, that in winter when we have the largest amount

of atmospheric electricity, our diseases are all, or nearly all, of an inflammatory character, while in masmatic localities the reverse is the case during summer and fall.

The effects of Ozone upon the respiratory organs is also demonstrative of this position. When inhaled strongly a burning sensation in the chest is produced, and rats, mice, young kittens, etc., placed in this atmosphere soon died, and in all cases a *post-mortem* revealed all the evidences of pneumonia.

This being the case, and ozone being oxygen in an allotropic condition, is it unreasonable to suppose that malaria is due to a lessening of free oxygen, which consequently lessens the amount of atmospheric electricity, and that the nervous system yields to this electrical or magnetic variation? This will beautifully account for that popular and well known theory, "that storms purify the air," as well as many other meteorological phenomena that are known to exist and can not otherwise be accounted for.

During the prevalence of cholera in Paris, in 1849, this was noticed in a marked degree. During a period of heat and moisture the number of cases daily increased up to six hundred and fifty per day, until sometime in June, when a thunder-storm of unusual severity occurred,—the number of cholera cases began to diminish until, within a very few days, only thirty per day were reported. During the above time it was noticed that an electrical deficiency existed in all cholera localities, and a Mr. Mather, of South Shields, England, found, that when the cholera prevailed there to an alarming extent, that a magnet which ordinarily sustained an armature of two pounds and ten ounces, would then only sustain one of one pound ten ounces. It was very hot and the atmosphere saturated with moisture.

These, with a variety of similar reasons, may be brought forward to prove the truth of, or at least the probability of this position, and that very slight meteorological as well as chemical changes produce very important results. In chemistry we know that a simple change in the elements of a substance change its character, as oil of lemon and oil of turpentine have exactly the same chemical constituents, yet we know them as totally different substances. So we find that in hydrocyanic acid and water, we have contained the elements of carbonic acid, ammo-

nia, oxalic acid, urea, formic acid, cyanuric acid, melam, ozulmin, hydromelonic acid, and so we might continue for pages.

Knowing these facts in chemistry, and seeing how readily a very simple and inoffensive substance may be changed into a deadly poison, we are surely justified in the opinion that very grave pathological consequences might result from very slight changes, and this from the exhaustion of nervous energy by the abstraction or lessening of atmospheric electricity, induced by changes in the distribution of that fluid, connected with such debilitating agents as fasting, loss of rest, extreme fatigue, and long exposure to heated air, etc. These, with many other reasons, might be offered, but we forbear at present, intending to give the subject further investigation.

DRY GANGRENE.

By E. SINNET, M.D., of Granville.

A CASE OF DRY GANGRENE.

BY E. SINNET, M.D., OF GRANVILLE.

On the 15th of November, 1860, Mr. M. consulted me with regard to the treatment of an enlarged parotid gland, which had made its appearance upon his daughter. The child was eleven months old, and had been quite healthy, excepting a slight attack of dysentery, two months previously.

To reduce the enlarged gland, I prescribed the Tinct. of Iodine, as an external application, and after regulating the secretions of the bowels by Hyd. Cum. Creta, I gave her the Iod. of pot. as an alterant, which soon removed the disease.

But some two weeks after I had considered the child quite well, the mother had a severe attack of Quinsy, which necessarily caused the child to be subjected to a change of diet, and exposures, to which she was unaccustomed. The gland immediately became inflamed, and for a time strongly resisted all the treatment which I gave the patient. About the middle of January last, I became satisfied that suppuration must take place before the size of the gland could be materially reduced, and accordingly I hastened it with epispastics and poultices, as best I could. This plan was continued some two weeks, when I lanced the abscess, and procured a free discharge of pus. I had hoped that this would have been the commencement of convalescence with the little sufferer; but not so, for during the six weeks, next following, it became necessary to use the lancet five different times; and there also appeared a disease which caused still greater suffering than that which had preceded it.

About the 20th of February the mother noticed a reddish-purple spot upon the right malor bone; the next day a similar spot was visible upon

the left side of the face, and within thirty-six hours these spots were an inch in diameter, and quite black, without very much inflammation, or any perceptible enlargement of the adjacent parts.

The mother's fears were seriously aroused at the sudden appearance of such spots, and I was hastily summoned to see the child, and found, upon examining the limbs, that the integument overlying the gastrœnemius muscle of either leg, was also as black as a coal. The colored parts were very dry, having no phlyctenæ, and a little depressed, with a slight elevation of the edges, and were but slightly painful to the touch.

This state of things continued about eight days, when these colored parts began to slough off, causing a very offensive smell, and leaving the gastrocnemius and zygomatic muscles quite denuded of their proper coverings.

These raw surfaces—which on the limbs were five or six inches in length and three inches in width, and upon the face one inch in diameter—continued regularly to heal until the last of April, when complete cicatrization was produced. The little patient now began to gain flesh and strength, notwithstanding the parotid gland continued to have a slight secretion of pus until the present month, June. My treatment of this case consisted in the administration, from time to time, of the different preparations of Iodine, of Iron, Sul. of Quinine, Cod-liver oil with rye whiskey, always keeping the secretions of the bowels regulated by Hyd. Cum. Creta, and the antacids mainly depending upon magnesia. During the whole treatment I had frequent recourse to anodynes, just sufficient to control the extreme pain and restlessness of the patient. As local applications I used Mercurial ointments, diluted Kreasote, and Simple Cerate.

After treating the case some weeks, I prevailed upon the mother to wean her child, and give it rich milk and cream, in connection with a few vegetables.

Such, gentlemen, is a brief report of a case which was new to me, and which I have watched with great interest; and being happily disappointed as to the result of the case, I have reported it, hoping to receive from my Seniors some new suggestions as to the cause, nature and treatment of similar diseases of infants.

One suggestion and I have done, and that is, the importance of a

close attention to the nourishment of infants at the breast, when suffering from chronic disease. Is it not a fact, that in the majority of such cases, the mother's breast gives forth nourishment that is imperfect, or deficient in some one material necessary to the healthy growth and perfection of the several tissues of the child? I feel, therefore, that in the treatment of all such cases the substitution of the milk of a good healthy cow, and one that is in a good condition, for that of the mother, is an adjuvant in our hands which should not be lost sight of.

REPORT

ON

LARYNGEAL PHTHISIS.*

By R. R. McMEENS, M.D., of Sandusky.

* Dr. McMeens being absent from the State, he was not able to present this report to the Society. Having received it after the close of the meeting, the Publication Committee have assumed the responsibility of publishing it. The high character of the report will be sufficient apology for the act of the Committee.

REPORT ON LARYNGEAL PHTHISIS.

BY R. R. M'MEENS, M.D., OF SANDUSKY.

LARYNGEAL Phthisis, or Phthisis Laryngea, are terms sufficiently significant to distinguish the disease they are intended to designate and diagnose, and are not to be considered synonymous, or confounded with the various active inflammatory and local affections common to the lining membrane of the larynx or its appendages, but confined to that obscure, irritative, diffused and ill-disposed condition which is inaugurated and prominently marked by morbid alteration of structure, general symptomatic disturbance, and constitutional depravation.

The disease, although frequently a precursor of phthisis pulmonalis, concomitant with it or superinduced by it, is not always, nor necessarily so complicated, but may exist, run its course, and expend its violence upon the several constituents concerned in the formation of the larynx without effecting any other important lesions.

From a residence and professional experience of about fifteen years in the region of country bordering upon the chain of our western inland lakes, where the disease, *sui generis*, is more frequently encountered than in most other localities, so far as the writer has observed or been informed, ample opportunities have been afforded to note the aspects and contemplate the progress of this formidable affection in almost every degree of development.

The frequent occurence of the complaint in the above locality is doubtless attributable to the climacteric conditions that characterize our springs in the immediate vicinity of the lakes, which are almost uniformly late, variable and inclement. The remarkable severity of the winds that prevail at this season of the year, is apparently owing to the immense masses of floating ice that are wafted about until dissolved or dispersed,

abstracting the latent caloric of the surrounding atmosphere, and imparting to it an extreme and sensible degree of chilliness and dampness —a fact strikingly perceptible and palpable to strangers on approaching the confines of the lake, and is highly exciting and often embarrassing to the respiratory organs, especially during tempestuous weather. The rigorous character of the vernal season, however, is fully compensated for by the mild and agreeable temperature, the mellowed tints and lingering loveliness of the autumns. These are the result of like metereological influences, the radiation of the retained caloric from the water, which serves to effectually preclude the formation or fall of frost until the latest crops and fruits have passed the period of its devastating blights.

In the following report the writer will be compelled, from enjoying no privilege of consulting any accredited authorities upon the subject, to restrict his comments upon the disease to a generalization of clinical observation and induction, comprised almost exclusively within the scope of his own practical experience. How far he may be able to add any thing of importance or contribute any thing of value to the subject under consideration, he can only submit with due deference to the judgment of others.

SYMPTOMS.

Laryngeal Phthisis is almost always insidious in approach, delusive in character, but persistent in progress. The writer has never witnessed an instance where the disease has directly succeeded to an acute attack of laryngitis, although such cases doubtless occur. The patient usually complains of having suffered for sometime from continuous, harassing but not severe sore throat, which is invariably aggravated upon the occurrence of damps and disagreeable weather, and proportionally ameliorated by a dry, warm and equable temperature. There is always present an obvious anxiety of expression and unnatural pallor of countenance. There is at first but slight hoarseness, and seldom any difficulty in swallowing, and but little cough or expectoration, but frequent and forcible hawking, with expulsion of a white viscous secretion, containing small circumscribed mucoid substances of considerable consistence.

There is an obtuse and variable degree of pain in the region of the larynx, extending in the direction of the posterior fauces to the back of the neck, in the shoulders and down the arms, cold and moist extremities, and an exquisite sensibility of the whole surface of the body to cold air. The pulse is somewhat accelerated and quick; general nervous irritability and slight exacerbations of febrile action toward evening. One of the most constant and pathognomonic symptoms is the remarkable alternation of voice that occurs; at one moment of a squeaking, shrill treble, and the next a low, harsh, hollow tone; and again an almost inaudible whisper. An inspection of the fauces reveals a dull and diffused redness and thickening of the mucous membrane, extensive follicular enlargement, and portions of its surface covered with long, narrow patches of an extremely glutinous secretion. The glottis presents a highly vascular condition, and evident signs of erosion of mucous membrane to a greater or less degree.

As the disease advances the hoarseness increases, and paroxysms of a dry, hacking and irritating cough, with permanent or partial aphonia ensue. The inspiration of cold air becomes painful, confining the patient within doors a greater part of the time, while an obscure but decided degree of hectic is developed, and often followed with general and debilitating night-sweats. Emaciation becomes now extremely rapid and conspicuous, the respiration laborious and irksome, and the patient morose and irritable. Auscultation may or may not elicit any abnormal sounds. If the disease has involved or extended to the lungs, dullness upon percussion will generally be manifested immediately under the clavicle. The expectoration acquires a more viscid and vitiated character, usually small in quantity, and interspersed particles of tuberculous matter, sometimes streaked with blood, or dark, offensive particles. The throat presents at this time a dull, spongy and granular appearance, with numerous ulcerative and apthous surfaces. The tonsils are enlarged and altered in texture, and the posterior fauces and nasal passages are affected with a troublesome and severe ozena, the discharge from which is perpetually falling upon the sensitive surfaces of the larynx and pharynx, giving rise to excessive nausea, efforts of vomiting and spasmodic contractions of the glottis.

If the disease is not relieved or arrested by this time, the genera

health of the patient rapidly declines and the symptomatic disturbances increase in extent, force and gravity; and if any constitutional proclivity or discrasy exists it becomes aroused into activity and adds its demands upon the already overtaxed and prostrated physical energies, and their combined ravages soon consummate the destruction of the victim.

In those cases where the disease pursues a more uncomplicated course, the respiration becomes stridulous and difficult, the countenance acquires a dingy complexion, the cough a peculiar guttural character, the voice becomes extinct and the lips livid and puffed, and the patient is occasionally suddenly cut off by destructive disorganization of the larynx precluding the entrance of air, or totally destroying the functions of the organ. In other cases the patient lingers and languishes an indefinite time, until worn out with long suffering and sheer exhaustion, or his miserable existence mercifully ended by the supervention of some other important lesion.

CAUSES.

The same causes that give rise to the inflammatory forms of laryngitis may also unquestionably induce laryngeal phthisis. One of the most frequent causes, so far as my observation extends, is that general depravation of health and nervous irritability induced from the intemperate use of ardent spirits, especially when of an adulterated and impure manufacture. This not only serves to unduly excite the mucous lining of the glottis and adjacent structures by immediate contact, but induces congestion of the whole respiratory system, and in the ecstasy of full intoxication almost invariably gives rise to vociferous and inordinate exercise of the laryngeal organs. The writer was professionally cognizant of a case, who, for a number of years, was in the habit of indulging in occasional and excessive debauches, who suffered for several days after every carousal from the total loss of voice and a hyperemic condition of those organs, and subsequently contracted and died from uncomplicated laryngeal phthisis. Exposure and severe exertion in tempestuous weather, and bleak and boisterous gales, especially in persons of irregular or reckless habits and insufficient bodily protection, is another frequent source of the affection, and it is consequently quite prevalent

among the dissolute and improvident class of men employed as sailors upon the lakes.

Syphilis is another prolific source of the complaint, particularly with those who have suffered from its ulcerative effects upon the throat, or whose constitution has become strongly impressed with the vice. Immoderate speaking or singing in ill-ventilated and overcrowded churches and public halls also conduces to its development, more especially in persons of strumous habit or pulmonary proclivities. Males, in accordance with my experience, are more liable to the disease than females. The exemption of the latter, in my field of operations, would seem to result from their more regular and moral habits, and the less necessity of bodily exposure.

PATHOLOGICAL CHARACTERS.

From the limited opportunities the writer has had to investigate the pathology of the disease, he can offer but little worthy any especial consideration, or that is not already known. The same changes are produced in the laryngeal mucous membrane as is observed in other membranes of the same nature from similar causes. There is redness, increased thickness and alteration of consistency, and degeneration of structure; pus is generally found upon its surfaces or lodged in sinuses, and numerous granulations are perceptible, as well as extensive follicular disease, both upon the surfaces of the larynx and pharynx, sometimes apparently filled with a yellowish matter; extensive ulcerations also exist, and the submucous cellular tissue is often œdematous and infiltrated with a morbid and murky fluid; erosions of the glottis and arytenoid, and cricoid cartilages are also present. The larynx is often diminished in size from a hypertrophied condition, and the vocal cords are occasionally partially or almost entirely destroyed.

DIAGNOSIS.

There is sometimes considerable difficulty in determining the actual existence of laryngeal phthisis in its incipient stages; the disease often commencing within or contiguous to the glottis, and consequently

almost entirely concealed from ocular examination. The peculiar character of the cough and the variable or permanent change of voice are among the most prominent indications of the disease. The absence of any signs of high inflammatory action will readily distinguish it from laryngitis proper. The previous history of the case will sufficiently discriminate its syphilitic origin or complication. It may be very clearly distinguished from phthisis pulmonalis, by the negative indications of the thorax and the prominent signs of laryngeal respiration.

PROGNOSIS.

The prognosis of the disease is exceedingly precarious, and difficult of prediction. Cases may continue for a length of time without presenting any important symptoms, or creating any degree of apprehension, and subsequently, without premonition or apparent provocation, suddenly assume the most untoward and intractable character. Such unpleasant occurrences, however, generally depend upon previously exciting vice of constitution, or perverse proclivity to other diseases. In cases of an uncomplicated character, and in persons of unimpaired constitution and some recuperative energy, a favorable result can be very generally anticipated, by the adoption of a prompt and judicious course of treatment. In individuals of a decided strumous habit, hereditary predisposition to phthisis, or syphylitic taint of constitution, the prognosis must be considered as decidedly unfavorable. Fœtor of the breath and sputa imply a destructive disorganization of some component portion of the organ. Rapid and visible emaciation, with failure of general functional integrity, shortness of breath, and dullness under the region of the clavicle, is indicative of extensive pulmonary complication, and inevitable fatality.

TREATMENT.

In proceeding to detail the treatment which has proved the most successful and satisfactory, as administered by myself or advised by others, the following arrangement, for the sake of brevity and convenience, will be adopted, and the various remedial agents, with their supposed

rationale of action, collated and considered in accordance with the objects they are intended to fulfill. First, the curative; second, the palliative; and thirdly, the corroborant or constitutional.

1. *Curative Measures.*

Remedies of a general nature are seldom urgently demanded at an early stage of the complaint; and the local indications accordingly take precedence, and should be promptly met, and persistently and judiciously pursued, until controlled and completely arrested, as the favorable issue of the case chiefly depends upon its successful subjugation at this time. Great care should also be exercised in the selection of remedies adapted to the peculiarities of individual cases, which should be governed, respectively, by the previous history, physical condition and habits, and inherited or acquired vices of constitution. One of the most prompt and efficient remedies in checking the incipient depredations of the disease is a solution of the nitrate of silver, in the proportion of 20 to 40 grs., to the ℥ j. of rose-water, applied to every part of the affected surface by means of a probang. This serves to directly arrest the progress of ulceration, or growth of granulations, reduces the vascular turgescence of the mucous membrane, annuls its unnatural sensibility, stimulates the existing morbid condition to healthier action, and protects denuded surfaces by its oxydation. This should be repeated only *pro re nata,* and at as extended intervals of time as the demands of the case will permit; and should subsequently be followed by some soothing detergent, similar to the subjoined:

℞.	Borax, ...	ʒ i.
	Tinct. myrrh, ...	℥ ss.
	Mel. despumat, ...	℥ j.
	Ag. rosa, ...	℥ iv.

M fl. gargarisma.

The above will serve to allay subsequent irritation, correct secretion, and gently stimulate and sustain reaction. The greatest caution and circumspection, however, is essential to insure the judicious and proper application of this potent preparation; and the seeming indifference and rudeness with which it is used by some can not be too severely censured

and condemned. The writer can recall to his recollection several unfortunate cases, of catarrhal irritation of the mucous lining of the larynx, that were forced into erosive and irretrievable disease by the inordinate and indiscriminate application of this violent escharotic, at a period that will be remembered by many, when affections of the throat were fashionable—especially among clergymen and the fairer portion of their followers, and the probang was flourishing in the full tide of popular and professional favor.

The remedy that, in my opinion, ranks next in virtue and value to the silver is a solution of the iodide of zinc; and where the disease has not already assumed a low and ulcerative disposition, but presents a diffused thickening of the mucous membrane and follicular enlargement as the prominent indications, will be found preferable, and should supersede it, when sufficient or equally efficacious, from its comparative safety. Its influence is more penetrating and permanent, and combines an alterative and deobstruent action, in addition to its stimulant and astringent properties.

When ulceration involves or is confined to the glottis, or within the larynx, either of the above solutions should be injected upon and into the larynx, by Anel's silver syringe, constructed for the purpose, or any other extempore contrivance that the ingenuity of the practitioner may be capable of devising. A solution of common salt and whiskey has, in several instances, exerted a decided alterative and salutary influence over the disease; and in one apparently unpromising case that came under my observation, sufficed to effect a cure. The throat should be effectually gargled with it, and at the same time a small portion of the solution swallowed. In cases presenting no decided disposition to phthisis, syphilitic sequences or mercurial erethism, the internal use of the protoiodide of mercury, combined with extract of cicuta, will prove very active in hastening the resolution of the disease.

The insufflation of subnitrate of bismuth, or alum and sugar, or the sulphates of zinc and copper, as recommended by MM. Trousseau and Belloc, may be advantageously resorted to. When the disease is consociated or indirectly complicated with syphilis, in addition to general treatment, the following gargle will be found a valuable auxiliary as a local application:

℞.	Hydrarg. chlor. corrisiv,	11 grs.
	Acidi hydrochlorici,	xx. gtts.
	Mel. despeimat,	℥ j.
	Ag. rosa,	℥ viij.

M. fl. gargarisma.

Blisters and other vesicating applications occasionally prove serviceable, as adjuvants. Some have alleged, or at least imagined, that they had derived benefit from the use of galvanic collars. Various other curative measures have been recommended, but are of so empirical and doubtful a nature as to be considered unworthy of notice or enumeration.

2. *Palliative Measures.*

Rest, and continued quiescence of the vocal organs, as consistent with their office, is of paramount importance, and should be strongly impressed upon the mind of the patient, and rigorously enforced as discipline. The spasmodic exacerbations of cough, which always aggravate the disease, and are harassing and painful to the patient, should be assuaged by anodynes, both administered and applied. The cannabis indica, either alone or combined with the salts of morphia and camphor, will usually fulfill the indication, and may be aided or alternated with the external application of the emplastrum belladonna or opii. The inhalation of medicated vapors often prove agreeable and palliative, and conduce to favor the patient with periods of prolonged repose. The tinct. of hyoscyamus and sulphuric ether, with vinegar or water, as also creasote, iodine and chlorine, constitute the medicinal substances ordinarily resorted to for this purpose. The balsams are sometimes peculiarly adapted to this object, in combination similar to the following:

℞.	Ol. sweet almonds,	aa. ℥ ss.
	Ol. aniseed,	
	Tinct. bals. fir,	
	Tinct. bals. tolu,	
	Alcohol,	℥ j.

M.

3. *Corroborant or Constitutional Measures.*

To promote and sustain the general health, and to economize the recuperative energies of the system, are measures of the first importance in every stage of the complaint; as without this all other treatment will prove abortive and unavailing, the disease, although local in character, being manifestly and intrinsically one of direct depression, of organic and vital force and general functional depravation. The selection of remedies suitable to individual cases, will be necessarily guided by the character of the constitutional symptoms. To maintain a standard of healthy secretion, and to invigorate the nutrient system, a regulated diet and regimen, aided by mild and alterative tonics; as, sarsaparilla, iodides of potassa and iron, prunis virginiana, gentian, and chalybeate waters, in connection with a congenial climate, are measures chiefly to be relied upon.

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Helmick J. ..... "
Helmick L. ..... Baltimore, Fair. Co.
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Hendren W. ..... Delaware.
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Hoover Isaac ..... Barnesville.
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Hopple Jas. ..... Moscow.
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Smith Vespasian ..New Carlisle.
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Snodgrass J. M. ...Ostrander.
Southard J. N. ....Marysville.
Spellman H. .....Medina.
Spencer C. C. .....Cincinnati.
Steele H. K. ..... "
Sterling E. .....Cleveland.
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Sweney R. L. .....Marion.

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Taggart Wm. W. ..Smithville.
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Thrall B. F. .....Cambridge.
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